



**Corridor Program**

Congestion Relief & Bus Rapid Transit Projects

# **APPENDIX W2**

## **Wetland Mitigation Plan**

### **I-405, SR520 to SR522 Stage 1 (Kirkland Stage 1)**

**Request For Proposal**  
**July 15, 2005**



**Washington State  
Department of Transportation**

**I-405, SR522 to SR520  
Kirkland Nickel Project**

# **Wetland Mitigation Plan**

**Washington State  
Department of Transportation**

**June 2005**



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## Acronyms and Abbreviations Used in this Report

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Acronym	Meaning
C	wetland creation as a form of compensatory mitigation
Corps	United States Army Corps of Engineers
DOT	US Department of Transportation
E	Wetland enhancement as a form of compensatory mitigation
EPM	Washington Department of Transportation Environmental Procedures Manual
Ecology	Washington State Department of Ecology
FAC	facultative
FACU	facultative upland
FACW	facultative wetland
MP	milepost
NI	no indicator status
NL	not listed
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	obligate
OHWM	ordinary high water mark
P	wetland preservation as a form of compensatory mitigation
PEM	palustrine emergent
PFO	palustrine forested
POW	palustrine open water
PSS	palustrine scrub-shrub
SMA	Washington State Shoreline Management Act
UPL	upland
USDA	United States Department of Agriculture
WDFW	Washington State Department of Fish and Wildlife
WIS	wetland indicator status
WSDOT	Washington State Department of Transportation

# Glossary

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Term	Meaning
best management practices (BMPs)	Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollutant discharges.
buffer	A designated area along the buffer of a stream or wetland that is regulated to control the negative effects of adjacent development from intruding into the aquatic resource.
dominant species	A plant species that exerts a controlling influence on or defines the character of a community.
emergent	A plant that grows rooted in shallow water, the bulk of which emerges from the water and stands vertically.
emergent wetland	In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.
enhancement	An improvement in the functions and values of an existing wetland typically through the planting of native plant species.
facultative (FAC)	Plant species that are equally likely to occur in wetlands (estimated probability 34 to 66 percent) or non-wetlands. See wetland indicator status.
facultative upland (FACU)	Plant species that usually occur in non-wetlands (estimated probability 67 to 99 percent) but are occasionally found in wetlands. See wetland indicator status.
facultative wetland (FACW)	Plant species that usually occur in wetlands (estimated probability 67 to 99 percent) but are occasionally found in non-wetlands. See wetland indicator status.
fill material	Any material placed in an area to increase surface elevation.
forested wetland	In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by woody vegetation that is 20 feet tall or taller.
gleyed	A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under anaerobic soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state.
groundwater	That portion of the water below the ground surface that is under greater than atmospheric pressure.

Term	Meaning
herbaceous	Having the characteristics of an herb; a plant with no persistent woody stem above the ground.
homogenous vegetation	A situation in which the same plant species association occurs throughout an area.
hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions in the upper part.
hydrology	The science dealing with the properties, distribution, and circulation of water.
hydrophyte	Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
hydrophytic vegetation	The sum total of plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
in-kind compensation	Compensation for lost wetland habitat with a replacement wetland of the same habitat type.
inundation	A condition in which water from any source temporarily or permanently covers a land surface.
invasive plant species	Plant species that become established easily in disturbed conditions, reproduce readily, and often establish monocultures. Most invasive plants are non-native species (i.e., were introduced to the Northwest intentionally or unintentionally by humans). Examples of common invasive species in the Pacific Northwest are Scot's broom, Canada thistle, hedge bindweed, English ivy, reed canarygrass, and purple loosestrife.
mitigation	Defined in WAC 197-11-766 as: (1) avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (5) compensating for the impact by replacing, enhancing or providing substitute resources or environments: and/or (6) monitoring the impact and taking appropriate corrective measures.
mottles	Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic anaerobic soil conditions.

<b>Term</b>	<b>Meaning</b>
obligate (OBL)	Plant species that almost always occur in wetlands under natural conditions (estimated probability greater than 99 percent). See wetland indicator status.
ordinary high water mark	The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; changes in the character of soil or vegetation; shelving; or the presence of a line of litter or debris.
out-of-kind compensation	Compensation for lost wetland habitat with a replacement wetland of a different habitat type
palustrine	In the USFWS classification system (Cowardin et al., 1979), freshwater areas (having less than 0.5 parts per thousand ocean-derived salts) dominated by trees, shrubs, persistent emergents, mosses, or lichens. They can be non- tidal or tidal. Palustrine also includes wetlands lacking this vegetation but having the following characteristics: (1) area less than 20 acres; (2) no active wave- formed or bedrock shoreline; (3) water depth in the deepest part is less than 6.6 feet at low water.
project area	The entire area within Kirkland Nickel project.
restoration	To improve an altered wetland by returning wetland parameters that may be missing. The restoration may return an original wetland habitat.
rhizosphere	The zone of soil in which interactions between living plant roots and microorganisms occur.
saturated soil conditions	A condition in which all easily drained voids (pores between soil particles) in the root zone are temporarily or permanently filled with water to the soil surface at pressures greater than atmospheric.
scrub-shrub	In the USFWS classification system (Cowardin et al., 1979), areas dominated by woody vegetation less than 20 feet tall. The species include tree shrubs, young trees, and trees or shrubs that are stunted because of environmental conditions.
soil matrix	The portion of a given soil having the dominant color. In most cases, the matrix will be the portion of the soil having more than 50 percent of the same color.
study area	Areas that were specifically evaluated for the presence of wetlands as defined by the Scope of Work for this project. This area is similar to the project area, but only includes areas within the I-405 right-of-way and stormwater facilities footprints.

Term	Meaning
ultimate category	The expected category of created or enhanced mitigation wetland that the wetland would achieve after the monitoring period is completed and vegetation has become completely established.
wetland	<p>Wetlands are formally defined by the US Army Corps of Engineers (Federal Register, 1982), the US Environmental Protection Agency (Federal Register, 1988), the Washington Shoreline Management Act of 1971 (SMA) (Ecology, 1991), and the Growth Management Act (GMA) (Ecology, 1992) as:</p> <p>... those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (Federal Register, 1982, 1986).</p> <p>The SMA and the GMA definitions add:</p> <p>Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990 that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificially-created wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.</p>
wetland boundary	The point on the ground at which a shift from wetlands to non wetlands or aquatic habitat occurs. These boundaries usually follow topographic contours.
wetland hydrology	The total of all wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

Term	Meaning
wetland indicator status (WIS)	<p>Categories of plant species based upon the estimated probabilities (expressed as a frequency of occurrence) of a species occurring in a wetland or non-wetland. Wetland indicator status categories include the following:</p> <p>Obligate (OBL): species that almost always occur wetlands under natural conditions (estimated probability &gt;99 percent).</p> <p>Facultative wetland (FACW): species that usually occur in wetlands (estimated probability 67 to 99 percent) but are occasionally found in non-wetlands.</p> <p>Facultative (FAC): species that are equally likely to occur in wetlands (estimated probability 34 to 66 percent) or non-wetlands.</p> <p>Facultative upland (FACU): species that usually occur in non-wetlands (estimated probability 67 to 99 percent) but are occasionally found in wetlands.</p> <p>Upland (UPL): species that almost always occur in non-wetlands under normal conditions (estimated probability &gt;99 percent).</p> <p>Not listed (NL): species that are not listed and are presumed to be upland species.</p> <p>No indicator status (NI): species that have not yet been evaluated.</p> <p>A (+) or (-) following the WIS of a given species signifies a greater or lesser likelihood of being found in wetland conditions.</p>

# 1.0 Introduction

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As part of the I-405 Congestion Relief and Bus Rapid Transit Projects, the Washington State Department of Transportation (WSDOT) is planning construction to improve I-405 between SR 520 in the City of Bellevue and SR 522 in the City of Bothell in King County, Washington. These improvements are titled I-405, SR 520 to SR 522-Kirkland Nickel Project, hereafter referred to as the Kirkland Nickel Project.

This Mitigation Plan for the Kirkland Nickel Project provides detailed information about the project, design measures taken to avoid and minimize wetland impacts, unavoidable impacts to 14 wetlands, and measures proposed to compensate for those impacts that will occur at three off-site mitigation areas. On-site restoration enhancement of temporarily-affected wetlands and buffers within the Kirkland Nickel Project will also be done. Site-specific on-site restoration plans will be developed by the design builder during the final design phase of the project and are not described herein.

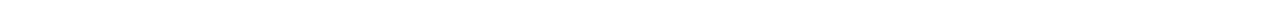
The *Kirkland Nickel Project Wetlands Discipline Report* (Wetlands Discipline Report) (WSDOT, 2005) was prepared to support environmental documentation for the Kirkland Nickel Project with regard to wetland resources in the project area. For the 33 wetlands in the project area, project biologists completed delineations, characterizations, ratings, and functional assessments. These included wetlands located within the City of Kirkland, the City of Bothell, and unincorporated King County.

The *Conceptual Wetland Mitigation Discipline Report* (WSDOT, 2004) was prepared to evaluate the feasibility of five potential mitigation sites. It includes a characterization of those sites and presents conceptual site layouts to determine the maximum potential of each site to provide various types of mitigation. WSDOT selected three off-site wetland mitigation areas based on the analysis presented in the *Conceptual Wetland Mitigation Discipline Report*. Following the site selection process, WSDOT prepared a *Draft Wetland Mitigation Plan* (WSDOT, 2005) that was developed to facilitate preliminary coordination and consultation with the permit agencies.

The purpose of this report is to provide detailed information about the proposed mitigation incorporating the comments and recommendations of the permit agencies. It is written to meet the requirements for a Final Mitigation Plan as described in the WSDOT Environmental Procedures Manual (EPM) Section 437 and in the *Implementing Agreement between The Washington State Department of Transportation and the Washington State Department of Ecology Concerning Wetlands Protection & Management* dated July 1, 1993 (hereafter cited as the 1993 Implementing Agreement). This Wetland Mitigation Plan is the document of record for compliance with permit conditions.



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## 2.0 Project Description

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Principal features of the Kirkland Nickel Project are:

- Roadway construction to add a northbound general-purpose lane from the I-405/NE 70th Street interchange to the I-405/NE 124th Street interchange.
- Roadway construction to add a southbound general-purpose lane from the I-405/SR 522 interchange to the I-405/SR 520 interchange.
- Reconstruction, realignment, and reconfiguration of the I-405/NE 116th Street interchange. This may also require some changes to local roadways.
- Construction and maintenance of stormwater management facilities that would provide water quality treatment, detention and conveyance system upgrades.

### 2.1 Mitigation Approach

Federal Executive Order 11990 of 1978 requires all federal agencies, as they carry out specific agency responsibilities, to consider wetland protection as an important part of their policies. This includes minimizing the destruction, loss, or degradation of wetlands, and preserving and enhancing the natural beneficial values of wetlands.

The US Department of Transportation (USDOT) seeks to assure the protection, preservation, and enhancement of the nation's wetlands to the fullest extent practicable during the planning, construction, and operation of transportation facilities and projects (DOT Order 5660.1A; Executive Order 11990). WSDOT projects with federal funding are subject to this order, including the Kirkland Nickel Project. Project-level design, environmental review, and permitting for this project include avoidance, minimization, restoration, and compensation of wetlands in accordance with Council on Environmental Quality (CEQ) regulations pertaining to mitigation sequencing.

Washington State Executive Order 90-04 mandates that the actions and activities of state agencies achieve a goal of "no net loss" of wetland acreage and function. In recognition of the "Wetlands Executive Order," WSDOT has adopted the "no-net-loss" goal as agency policy and will meet this requirement for the Kirkland Nickel Project at both the project-wide and intra-jurisdictional level.

Wetland mitigation by WSDOT for their projects are currently subject to the 1993 Implementing Agreement. The mitigation approach described in this mitigation plan has been designed to meet the "no net loss" guidance mandated under federal and state executive orders and to meet the mitigation sequencing, compensation, reporting, and monitoring requirements stipulated in the 1993 Implementing Agreement.

#### 2.1.1 Avoidance and Minimization Measures

The following avoidance and minimization measures have been incorporated into the project design to allow WSDOT to meet the transportation improvement challenge without directly affecting important natural resources:

- Specific wetlands are to be avoided where practicable.
- Associated facilities, such as stormwater treatment systems and access roads are to be located outside of the identified sensitive areas where practicable.

- The project footprint is to be minimized.
- Operational analysis will allow project designers to use existing shoulders or access lanes and thereby limiting the amount of new roadway required.

Specific avoidance and minimization measures are identified in Tables 2-1 and 2-2.

**Table 2-1: Filled or Disturbed Wetlands, I-405 Kirkland Nickel Project**

<b>Wetland Identifier</b>	<b>Area (acres)</b>	<b>Permanent Impact Area (acres)</b>	<b>Temporary Impact Area (acres)</b>	<b>Local Jurisdiction and Rating</b>	<b>Wetland Category</b>	<b>Avoidance and Minimization</b>
16.2R	0.847	0.000	0.000	Kirkland - 2	II	Moved detention pond to avoid impacts.
16.3L	0.031	0.031	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
16.5L	0.064	0.064	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
17.1R	0.021	0.000	0.000	Kirkland - 3	IV	Direct impacts avoided. Temporary impacts to buffer unavoidable during construction.
17.3R	0.048	0.000	0.000	Kirkland - 3	IV	Avoided
17.7R	0.096	0.000	0.000	Kirkland - 3	IV	Avoided
18.05R	0.134	0.000	0.000	Kirkland - 3	IV	Avoided
18.06L	0.047	0.000	0.000	Kirkland - 3	IV	Avoided
18.0R	0.102	0.000	0.000	Kirkland - 3	IV	Avoided
18.15R	0.05	0.000	0.000	Kirkland - 3	IV	Avoided
18.1R	1.309	0.000	0.000	Kirkland - 3	IV	Avoided
18.2R	0.068	0.000	0.000	Kirkland - 3	IV	Avoided
18.3R	0.028	0.000	0.000	Kirkland - 3	IV	Avoided
18.4R	0.037	0.037	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.27R	0.105	0.078	0.023	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.3R	0.249	0.248	0.000	Kirkland - 2	III	Unavoidable due to roadway design standards.
19.5L	0.574	0.574	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
19.6L	0.011	0.011	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.6R	0.051	0.051	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.7R	0.252	0.064	0.028	Kirkland - 3	III	Unavoidable due to roadway design standards.
19.8L	0.341	0.000	0.000	Kirkland - 3	IV	Direct impacts avoided. Temporary impacts to buffer unavoidable during construction.
19.9L	0.443	0.000	0.000	Kirkland - 3	III	Avoided
19.9R	0.088	0.069	0.018	Kirkland - 3	IV	Unavoidable due to drainage requirements.
20.0L	0.08	0.000	0.000	Kirkland - 3	IV	Avoided
20.34L	0.279	0.000	0.000	Kirkland - 3	III	Avoided
20.35L	0.165	0.000	0.000	Kirkland - 3	IV	Direct impacts avoided.

Wetland Identifier	Area (acres)	Permanent Impact Area (acres)	Temporary Impact Area (acres)	Local Jurisdiction and Rating	Wetland Category	Avoidance and Minimization
						Temporary impacts to buffer unavoidable during construction.
20.4L	2.759	0.000	0.000	Kirkland - 2	II	Avoided
21.6L	0.093	0.042	0.011	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
21.7L	0.242	0.138	0.031	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
21.8L	0.054	0.054	0.000	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
22.5L	0.025	0.000	0.000	King County - 3	III	Direct impacts avoided. Retaining wall added to limit impacts to buffer.
22.8L	1.156	0.136	0.099	Bothell - 3	III	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
23.2L	0.307	0.000	0.000	Bothell - 2	III	Direct impacts avoided. Footprint adjusted to avoid impacts.
<b>TOTAL</b>	<b>10.156</b>	<b>1.599</b>	<b>0.207</b>			

**Table 2-2: Impacts to Buffer Areas, I-405 Kirkland Nickel Project**

Wetland Identifier	Local Rating	Local Buffer Required (feet)	Temporary Buffer Impact (acre)	Permanent Buffer Impact (acre)	Avoidance and Minimization
17.1R	Kirkland – 3	25	0.001	0	Temporary impacts unavoidable during construction.
18.0R	Kirkland - 3	25	0.018	0.001	Unavoidable due to noise mitigation facilities.
19.27R	Kirkland - 3	50	0.028	0.495	Unavoidable due to roadway design standards.
19.3R	Kirkland – 2	75	0	0.556	Unavoidable due to roadway design standards.
19.7R	Kirkland - 3	50	0.065	0.296	Unavoidable due to roadway design standards. Bridge Wingwall added to limit impacts.
19.8L	Kirkland - 3	50	0.038	0	Temporary impacts unavoidable during construction.
19.9R	Kirkland - 3	50	0.069	0.358	Unavoidable due to drainage requirements.
20.35L	Kirkland – 3	50	0.021	0	Temporary impacts unavoidable during construction.
21.6L	King County - 4	50	0.024	0.141	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.

Wetland Identifier	Local Rating	Local Buffer Required (feet)	Temporary Buffer Impact (acre)	Permanent Buffer Impact (acre)	Avoidance and Minimization
21.7L	King County - 4	50	0.024	0.167	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
22.5L	King County - 3	75	0.058	0.308	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
22.8L	Bothell - 3	50	0.036	0.14	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
23.2L	Bothell - 2	75	0.026	0.27	Unavoidable due to drainage requirements. Footprint adjusted to minimize impacts.
<b>TOTAL</b>			<b>0.408</b>	<b>2.732</b>	

## 2.1.2 Restoration

The proposed project is anticipated to result in approximately 0.191 acres of temporary wetland impacts and 0.409 acres of temporary impact to wetland buffer area regulated by local jurisdictions (City of Kirkland, King County, or City of Bothell). Any temporary impacts to wetlands and locally regulated wetland buffers resulting from the project will be restored following construction. Site-specific on-site restoration plans will be developed by the design builder during the final design phase of the project and are not described herein.

## 2.1.3 Compensatory Mitigation

The Kirkland Nickel project will result in unavoidable impacts to 1.599 acres of wetlands (WSDOT, 2005). These impacts will be offset through off-site compensatory mitigation. WSDOT will also provide mitigation to offset temporal losses to wetland and buffer functions that will occur between the time when the impact occurs and the replacement wetlands and restored wetlands and buffers are fully established.

## 2.2 Wetland Summary

Project biologists delineated 33 wetlands totaling approximately 10.156 acres within the study area. All of the wetlands within the project area have been disturbed to some extent by development, including the construction of I-405 and development in the surrounding area. Complete descriptions of each wetland are included in the Wetlands Discipline Report (WSDOT, 2005) for the Kirkland Nickel Project and are summarized in Section 2.2.2.

### 2.2.1 General Setting

WSDOT identified the study area for the wetland delineation and impact assessment work based on the anticipated construction footprint. The study area includes the right-of-way adjacent to the existing southbound lanes (generally the west side of the road corridor and undeveloped center median) between the northern extent of access ramps to SR 520 and the southern extent of southbound ramps from SR 522. The study area includes the right-of-way adjacent to the existing northbound lanes (generally the east side of the road corridor between approximately Northeast 65th Street and the Burlington Northern Santa Fe Railway

undercrossing north of Northeast 116th Street, inclusive of the Northeast 116th Street interchange). The study area also includes parcels beyond the right-of-way in and around proposed drainage system improvements, and King County- and WSDOT-owned parcels between the existing Brickyard Park and Ride and I-405 at approximately 15530 Juanita-Woodinville Way Northeast.

## 2.2.2 Wetland Descriptions

The following sections describe the wetlands identified in the study area. This information has been excerpted from the Wetland Discipline Report (WSDOT 2005). The wetland areas shown represent the total area of wetland delineated within the entire study area, not within the area of impact. The majority of the following wetland descriptions reflect late winter conditions, which were observed when field investigations were conducted in mid-February and early March. Wetlands in the study area are described in location sequence from south to north. Each wetland identified in the field was assigned a number based on its milepost (MP) location within the study area, starting with MP 15.9 at the south end of the study area and extending north to MP 23.4. The wetland number also includes an "L" if the wetland is located on the left (west) side of I-405 or an "R" if it is located on the right (east) side of I-405 (looking to the north). For example, a wetland found at the midpoint between MP 19 and MP 20 on the left side of I-405 would be Wetland 19.5L.

Wetland descriptions are grouped into one of four drainage basins depending on wetland location: East Lake Washington (Yarrow Creek), Forbes Creek, Juanita Creek, and the Sammamish River. Table 2-3 following these descriptions presents a summary of the wetlands in the Kirkland Nickel project area.

### East Lake Washington (Yarrow Creek)

Wetlands in the East Lake Washington (Yarrow Creek) drainage basin are generally located between the southern project boundary or NE 40th Street and the NE 85th Street interchange (MP 15.9 to 18.2). Within this section, transportation improvements are proposed for the southbound lanes only between MP 15.9 and 17. North of MP 17 transportation improvements are proposed for both northbound and southbound lanes.

#### Wetland 16.2R

*Size and location:* 0.847-acre wetland near the south end of the Kirkland city limits. The wetland is identified as "Yarrow 2" in *Kirkland's Streams, Wetlands, and Wildlife Study* (Watershed Company, 1998). Portions of wetland 16.2R extend out of the project area to the north.

*Vegetation:* Dominated by black cottonwood, red alder, and salmonberry. Douglas-fir and big-leaf maple occur in adjacent upland area to the west and south.

*Soils:* A layer of black (10YR 2/1) silt loam extending to 12 inches, over a subsoil layer of olive brown (2.5Y 4/3) sand.

*Hydrology:* Soils are saturated to the surface in the soil pit, large areas of standing water elsewhere in the wetland.

*Wetland Classification:* Wetland 16.2R is a large PFO wetland that is semi-permanently flooded. It is a Category II wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* This wetland provides the majority of functions evaluated under Null et al. (2000). Because it is depressional with a constricted outlet, it provides flood flow alteration, and nutrient and toxicant removal. It also provides wildlife habitat and native

plant richness because it contains multiple vegetation classes and relatively few invasive species.

*Wetland Determination:* The boundary of Wetland 16.2R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species such as Douglas-fir, beaked hazelnut, and sword fern.

### **Wetland 16.3L**

*Size and location:* 0.03-acre wetland near the south end of the Kirkland city limits, adjacent to I-405 southbound road shoulder. The wetland area has been ditched and carries stormwater runoff from I-405.

*Vegetation:* Dominated by reed canarygrass. Douglas-fir, big-leaf maple, and vine maple occur in adjacent upland area.

*Soils:* A layer of very dark gray (2.5Y 3/1) gravel and sand fill extending to 12 inches, over a subsoil layer of olive brown (2.5Y 4/4) gravel and sand fill.

*Hydrology:* Free water present to the surface in the soil pit, areas of standing water elsewhere in the ditch.

*Wetland Classification:* Wetland 16.3L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 16.3L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Wetland 16.5L**

*Size and location:* 0.064-acre wetland near the south end of the Kirkland city limits, adjacent to I-405 southbound road shoulder. The wetland is adjacent to a roadside ditch that carries stormwater runoff from I-405.

*Vegetation:* Dominated by reed canarygrass and bentgrass.

*Soils:* Surface layer of black (10YR 2/1) loamy sand extending to 5 inches deep, over a B horizon of dark grayish brown (2.5Y 4/2) sand with dark yellowish brown (10YR 4/4) mottles.

*Hydrology:* Soil pit inundated with one inch of water, standing water throughout the wetland.

*Wetland Classification:* Wetland 16.5L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 16.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Wetland 17.1R**

*Size and location:* 0.02-acre wetland bordering I-405 near the NE 70th Street exit off-ramp, hydrologically connected to a ditch in the shoulder of the road. This wetland appears to have been intentionally constructed in an area that was historically upland for the purpose of stormwater detention.

*Vegetation:* Dominated by reed canarygrass and bentgrass, with a small number of black cottonwood saplings.

*Soils:* An A horizon that extends to 4 inches depth and is a very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 4 inches to at least 16 inches deep and is a dark gray (5Y 4/1) loamy sand with gravels and olive brown (2.5Y 4/3) mottles.

*Hydrology:* Saturated soils at the surface with free water within one inch of the surface in the soil pit, discharges into a catchbasin at its northern boundary.

*Wetland Classification:* Wetland 17.1R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 17.1R are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405 and contains dense herbaceous vegetation.

*Wetland Determination:* The boundary of Wetland 17.1R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Wetland 17.3R**

*Size and location:* 0.048-acre wetland on the north side of the 72nd Street bridge, between I-405 and a noise wall, hydrologically connected to a ditch receiving water from upstream flow and road runoff. Water flows to a catchbasin at the northern end of the wetland.

*Vegetation:* Dominated by reed canarygrass and bentgrass with some soft rush and watercress.

*Soils:* A deep A horizon extending to at least 16 inches that is a very dark grayish brown (2.5Y 3/2) sand and gravel with strong brown (7.5YR 4/6) mottles.

*Hydrology:* Soils in the soil pit were saturated within 10 inches of the surface.

*Wetland Classification:* Wetland 17.3R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 17.3R are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405 and contains dense herbaceous vegetation.



*Wetland Determination:* The boundary of Wetland 17.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

#### **Wetland 17.7R**

*Size and location:* 0.096-acre wetland located south of both the pedestrian / bicycle overcrossing and the NE 85th Street exit between I-405 and a noise wall. Wetland is hydrologically connected to a ditch receiving water from road runoff and an incoming culvert. The water then flows into a catchbasin at the northern end of the wetland.

*Vegetation:* Dominated by bentgrass, reed canarygrass, and common cattail with some soft rush present.

*Soils:* An A horizon from the surface to 6 inches deep that is a very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 6 inches to at least 16 inches deep and is a very dark gray (2.5Y 3/1) sandy gravelly loam with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Saturated soils at the surface with free water in the soil pit within 8 inches of the surface.

*Wetland Classification:* Wetland 17.7R is a small PEM wetland that is semi-permanently saturated and seasonally flooded. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, seasonally contains ponded water, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 17.7R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation for a long period of time, and the presence of upland plant species.

#### **Wetland 18.0R**

*Size and location:* 0.101-acre wetland south of the NE 85th Street exit between I-405 and a noise wall. Wetland is hydrologically connected to a ditch and a seep receiving water from road runoff and hillside seeps.

*Vegetation:* Dominated by common velvetgrass and bentgrass with lesser amounts of other hydroseeded grasses.

*Soils:* An A horizon, extending from the surface to 2 inches depth, consisting of very dark grayish brown (10YR 3/2) silty sandy loam. The B horizon extends from 2 inches to 16 inches deep and is a dark grayish brown (2.5Y 4/2) gravelly sandy loam with yellowish brown (10YR 5/6) mottles.

*Hydrology:* Saturated soils at the surface and free water within 2 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 18.0R is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal function of Wetland 18.0R is production of organic matter and its export. Wetland contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 18.0R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads, topographic changes, and the boundary of groundwater seeps. Adjacent uplands were distinguished from the wetland by lack of hydrophytic vegetation or wetland hydrology, and the presence of upland plant species.

#### **Wetland 18.05R**

*Size and location:* 0.134-acre wetland in the southeast portion of the NE 85th Street interchange, bordered by northbound I-405 to the west and the northbound off-ramp to the east, and the cloverleaf to the north. Wetland is hydraulically connected to Wetland 18.1R to the north through a culvert beneath the on-ramp.

*Vegetation:* Dominated by bentgrass, soft rush, velvetgrass, black cottonwood, and paper birch.

*Soils:* An A horizon of greenish gray (Gley 1 5/5GY) gravel and sandy fill with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Saturated soils at the surface and free water within 3 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 18.05R is a small PFO wetland that is seasonally saturated/flooded. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of Wetland 18.05R are flood flow alteration, sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, is relatively flat, contains dense herbaceous and deciduous vegetation, and is seasonally inundated.

*Wetland Determination:* The boundary of Wetland 18.05R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by lack of wetland hydrology.

#### **Wetland 18.06L**

*Size and location:* 0.047-acre wetland in the southwest portion of the NE 85th Street interchange, primarily within a roadside ditch on a gentle north-facing slope. *Vegetation:* dominated by reed canarygrass, common cattail, and red alder.

*Soils:* Deep A horizon that extends to at least 16 inches depth and is a black (10YR 2/1) silt loam.

*Hydrology:* Soil saturation to the surface of the soil pit and free water at a depth of 3 inches in the soil pit, standing water throughout the northern portions of the wetland.

*Wetland Classification:* Wetland 18.06L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 18.06L are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and discharges into a catchbasin.

*Wetland Determination:* The boundary of Wetland 18.06L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation, or hydric soil indicators, and the presence of upland plant species.

#### **Wetland 18.1R**

*Size and location:* 1.309-acre wetland in the southeast portion of the NE 85th Street interchange, on a gentle north-facing slope. The central portions of the wetland are hydrologically connected with ditches.

*Vegetation:* Dominated by willow, red fescue, soft rush, paper birch, and bitter cherry.

*Soils:* Greenish gray (Gley 1 5/5GY) gravel and sand, with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Soil saturation to the surface and free water within 6 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 18.1R is a medium-sized PFO wetland that is semi-permanently flooded and occasionally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal function of Wetland 18.1R is production and export of organic matter. The wetland contains deciduous trees, shrubs, and dense herbaceous plants and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 18.1R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetlands by the lack of hydric soil indicators and the presence of upland plant species.

#### **Wetland 18.15R**

*Size and location:* 0.05-acre wetland in the northeast portion of the NE 85th Street interchange, a narrow swale near the center of the interchange cloverleaf.

*Vegetation:* Dominated by velvetgrass, soft rush, and bentgrass.

*Soils:* An A horizon to 6 inches deep consisting of dark grayish brown (2.5Y 4/2) sandy loam. A B horizon extends to at least 13 inches depth and is also a dark grayish brown (2.5YR 4/2) sandy loam but contains dark yellowish brown (10YR 4/4) mottles. Soils were extremely compacted below 13 inches.

*Hydrology:* Soil saturation at the surface and free water at a depth of 12 inches in the soil pit.

*Wetland Classification:* Wetland 18.15R is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of Wetland 18.15R are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and discharges into a catchbasin.

*Wetland Determination:* The boundary of Wetland 18.15R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to

the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Wetland 18.2R**

*Size and location:* 0.068-acre wetland east of the northbound I-405 ramp at the NE 85th Street interchange, in a narrow topographic depression near the WSDOT right-of-way fence.

*Vegetation:* Dominated by black cottonwood at the north end with red alder, Douglas spirea, and reed canarygrass occurring throughout the wetland.

*Soils:* An A horizon to 16 inches deep consisting of black (10YR 2/1) gravelly sandy loam.

*Hydrology:* Soils are saturated to the surface, and free water was observed within 2 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 18.2R is a small PFO wetland that is seasonally saturated and inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of Wetland 18.2R are sediment removal and production and export of organic matter. The wetland has dense herbaceous vegetation and receives road and parking lot runoff. Additionally, the wetland contains deciduous trees and shrubs and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 18.2R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Forbes Creek**

Wetlands in the Forbes Creek drainage basin are generally located between the NE 85th Street interchange and the NE 124th Street interchange (MP 18.2 to 19.9). Within this section, transportation improvements are proposed for both southbound and northbound lanes.

### **Wetland 18.3R**

*Size and location:* 0.028-acre wetland northeast of the NE 85th Street interchange, near the northbound I-405 on-ramp, in a narrow topographic depression near the WSDOT right-of-way fence.

*Vegetation:* Dominated by black cottonwood, reed canarygrass, Douglas spirea, and red alder.

*Soils:* An A horizon of black (2.5Y 2.5/1) sandy loam extending to 5 inches depth over a B horizon of black (2.5Y 2.5/1) sand extending to at least 16 inches depth.

*Hydrology:* Saturated soils at the surface and free water within 4 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 18.3R is a small PFO wetland that is seasonally saturated and inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of Wetland 18.3R are sediment removal and production and export of organic matter. The wetland has dense herbaceous vegetation and receives road and parking lot runoff. Additionally, the wetland contains deciduous trees and shrubs and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 18.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators.

#### **Wetland 18.4R**

*Size and location:* 0.037-acre wetland in a shallow depression southeast of Forbes Lake, just south of a noise wall that borders the WSDOT right-of-way.

*Vegetation:* Dominated by bentgrass and black cottonwood saplings.

*Soils:* Very dark grayish brown (2.5Y 3/2) sandy gravelly loam, extending to below 16 inches depth. No hydric soil indicators. However, the area appears to be a human-induced wetland that receives runoff from I-405. Hydric soil characteristics would be expected to form in the future, assuming the current hydrological conditions persist.

*Hydrology:* No hydric soil indicators. However, the area appears to be a human-induced wetland that receives runoff from I-405. Hydric soil characteristics would be expected to form in the future, assuming the current hydrologic conditions persist. Soil was saturated at one inch deep and free water was observed at 10 inches depth in the soil pit. Areas of standing water were present elsewhere in the wetland.

*Wetland Classification:* Wetland 18.4R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The chief functions of Wetland 18.4R are flood flow alteration and sediment removal. The wetland is a depression that lacks a defined outlet that receives runoff from I-405. Sediment deposits were observed in this wetland during field investigation.

*Wetland Determination:* The boundary of Wetland 18.4R was flagged where indicators of wetland vegetation and wetland hydrology were present. These corresponded to the base of fill for the adjacent road and topographical changes. Adjacent uplands were distinguished from the wetland by lack of soil saturation and the presence of upland plant species.

#### **Wetland 19.27R**

*Size and location:* 0.105-acre wetland south of the NE 116th Street exit, near the WSDOT right-of-way fence and extends downslope toward I-405 and along the road shoulder. The wetland continues off-site as a forested wetland outside of the WSDOT right-of-way to the west that is mapped in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998).

*Vegetation:* Dominated by reed canarygrass with some common cattail and soft rush present.

*Soils:* A horizon extends to 12 inches deep, very dark brown (10YR 2/2) sandy loam. The B horizon extends from 12 inches to at least 16 inches deep, dark grayish brown (10YR 4/2) gravelly sandy loam with dark yellowish brown (10YR 4/4) mottles.

*Hydrology:* Saturated soils at the surface and free water in the soil pit at 3 inches below the surface. Several areas of standing water were present. Hand auguring found water within 10 inches of the surface throughout the majority of the wetland.

*Wetland Classification:* Wetland 19.27R is a medium-sized PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of Wetland 19.27R are flood flow alteration, sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives runoff and floodwaters from adjacent development, contains dense vegetation, and is seasonally inundated. Additionally, the wetland has a surface connection to a stream.

*Wetland Determination:* The boundary of Wetland 19.27R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

### **Wetland 19.3R**

*Size and location:* 0.248-acre south of the NE 116th Street interchange off-ramp, extending east outside of the WSDOT right-of-way. That portion of Wetland 19.3R that occurs beyond the right-of-way is forested and has been mapped in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998).

*Vegetation:* Dominated by reed canarygrass, bentgrass, and small-fruited bulrush.

*Soils:* An A horizon extending to 15 inches depth that is a very dark grayish brown (10YR 3/2) sandy clay loam. Dark yellowish-brown (10YR 4/6) mottles are present between 6 and 15 inches deep. The B horizon extends from 15 inches to at least 18 inches depth and is a greenish-gray (GLEY 1 5/5GY) sandy clay loam with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Saturated soils at the surface and free water present in the soil pit at 10 inches depth. Standing water in the wetland flows north, eventually becoming a channelized stream that discharges to a culvert extending west beneath I-405.

*Wetland Classification:* Wetland 19.3R is a medium-sized PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland contains dense vegetation and receives runoff from nearby development. Additionally, the wetland has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 19.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

### **Wetland 19.5L**

*Size and location:* 0.574-acre south of the NE 116th Street interchange on-ramp, receives water from road runoff and hillside seeps. Water leaves the wetland through a ditch that extends along the west side of the wetland and into a culvert.

*Vegetation:* Dominated by reed canarygrass, soft rush, and bentgrass with some velvetgrass and western red cedar saplings.

*Soils:* An A horizon extending from the surface to 6 inches depth and consisting of a very dark gray (2.5Y 3/1) silt loam. B horizon extends from 6 inches to 10 inches deep and is a dark

gray (2.5Y 4/1) sandy loam with dark yellowish brown (10YR 4/6) mottles. C horizon extends from 10 inches to at least 16 inches depth and is a dark gray (GLEY 1 4/N) sand.

*Hydrology:* Saturated soils at the surface and free water within 10 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 19.5L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and a culverted outlet.

*Wetland Determination:* The boundary of Wetland 19.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

#### **Wetland 19.6L**

*Size and location:* 0.011-acre wetland immediately west of the southbound NE 116th Street on-ramp, within a ditch that receives road runoff and releases water into a catchbasin at the northern end of the wetland.

*Vegetation:* Dominated by reed canarygrass and bentgrass.

*Soils:* An A horizon extends from the surface to at least 16 inches depth that is a very dark gray (2.5Y 3/1) gravelly sandy loam with light olive brown (2.5Y 5/6) mottles.

*Hydrology:* Inundated soils with 3 inches of water throughout much of the wetland.

*Wetland Classification:* Wetland 19.6L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff and contains dense herbaceous vegetation.

*Wetland Determination:* The boundary of Wetland 19.6L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

#### **Wetland 19.6R**

*Size and location:* 0.051-acre wetland on the east side of the northbound NE 116th Street interchange off-ramp, hydrologically connected to a ditch receiving water from road runoff, hillside seeps, and a culvert situated at the northeast end of the wetland. Drains to a catchbasin in the northern end of the wetland.

*Vegetation:* Dominated by reed canarygrass.

*Soils:* An A horizon extends from the surface to 6 inches depth and consists of very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 6 inches to 11 inches deep, with very dark grayish brown (2.5Y 3/2) sandy loam and strong brown (7.5YR 4/6)

mottles. The soil was compact at 11 inches and could not be investigated to any further depth.

*Hydrology:* Saturated soils within 8 inches of the surface and free water present within 10 inches of the surface in the soil pit.

*Wetland Classification:* Wetland 19.6R is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 19.6R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators.

### **Wetland 19.7R**

*Size and location:* 0.252-acre wetland on the east side of I-405, on the north side of NE 116th Street and extending outside the WSDOT right-of-way fence. Contains two topographically different wetland areas: to the south a constructed ditch is adjacent to NE 116th Street and to the north roadside runoff and hillside seeps contribute water to the wetland, which drains through a catchbasin at its southwest end.

*Vegetation:* South end is dominated by Himalayan blackberry, reed canarygrass, and bentgrass with lesser amounts of western red cedar and small-fruited bulrush. The northern hillside seep portion of wetland is dominated by reed canarygrass.

*Soils:* In the south portion, an A horizon extends from the surface to 6 inches deep, with very dark grayish brown (2.5Y 3/2) gravelly loam. The B horizon extends from 6 inches to 10 inches deep and consists of a dark grayish brown (2.5Y 3/2) loam with dark yellowish brown (10YR 4/6) mottles. Soils compacted below 10 inches depth. In the north portion, an A horizon was present from the surface to 3 inches deep, consisting of very dark gray (2.5Y 3/1) silt loam. The B horizon, extending from 3 inches to at least 14 inches depth, is a greenish gray (5/10Y) gravelly silt loam.

*Hydrology:* South end of wetland was inundated with 5 inches of water. The hillside seep portion was saturated to the surface and free water was present at 8 inches below the surface.

*Wetland Classification:* Wetland 19.7R is a PSS wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are flood flow alteration, sediment removal and production, and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 19.7R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation, including Himalayan blackberry.



### **Wetland 19.8L**

*Size and location:* 0.341-acre wetland, south of the NE 124th Street interchange, situated in the WSDOT right-of-way and extending past the right-of-way fence; receives water from road runoff as well as hillside seeps. The water leaves the wetland via a roadside ditch outside of the WSDOT right-of-way to the southwest. *Vegetation:* dominated by reed canarygrass with lesser amounts of Himalayan blackberry and bentgrass.

*Soils:* An A horizon, extending from the surface to at least 16 inches depth, consisting of a very dark grayish brown (10YR 3/2) loam with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Saturated soils are at the surface, and free water was present at one inch depth in the soil pit.

*Wetland Classification:* Wetland 19.8L is a PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal function of this wetland is production and export of organic matter. The wetland contains dense herbaceous vegetation and has an outlet from which organic matter is flushed.

*Wetland Determination:* The boundary of Wetland 19.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation including Douglas-fir.

### **Juanita Creek**

Wetlands in the Juanita Creek drainage basin are generally located between the NE 124th Street interchange and the 116th Avenue NE interchange (from MP 19.9 to 22.5). Within this section, transportation improvements are proposed for the southbound lanes only.

### **Wetland 19.9L**

*Size and location:* 0.443-acre wetland on the west side of I-405, between the southbound on-ramp of NE 124th Street and I-405, hydrologically connected to a ditch receiving water from road runoff and surface flow.

*Vegetation:* Southern portion is dominated by reed canarygrass and bentgrass with small amounts of evergreen blackberry; the forested northern portion is dominated by red alder with a small amount of willow present.

*Soils:* Southern portion contains an A horizon extending from the surface to at least 16 inches depth, with very dark grayish brown (10YR 3/2) sandy loam and strong brown (7.5YR 4/6) mottles. Northern portion contains an A horizon extending from the surface to 6 inches depth with very dark grayish brown (2.5Y 3/2) sandy loam and light olive brown (2.5Y 5/6) mottles. The B horizon extends from 6 inches to at least 16 inches deep and is a dark gray (5Y 4/1) loam with light olive brown (2.5Y 5/6) mottles.

*Hydrology:* In the southern portion, saturated soils within 10 inches of the surface and free water within 16 inches of the surface, in northern portion, saturated soils to the surface and free water within 8 inches of the surface.

*Wetland Classification:* Wetland 19.9L is a PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and discharges into a catchbasin.

*Wetland Determination:* The boundary of Wetland 19.9L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation.

#### **Wetland 19.9R**

*Size and location:* 0.088-acre wetland located in the southeast quadrant of the 124th Street interchange, associated with a ditch that carries stormwater runoff from I-405.

*Vegetation:* Reed canarygrass, soft rush, and Himalayan blackberry with planted Douglas fir and big leaf maple adjacent upland area.

*Soils:* A layer of black (10YR 2/1) silt loam with gravels 16 inches, over a subsoil layer of dark gray (10YR 4/1) sandy loam.

*Hydrology:* Saturated soils at the surface with free water within 15 inches of the surface in the soil pit, discharges into a catchbasin at its northern boundary.

*Wetland Classification:* Wetland 19.9R is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and a culverted outlet.

*Wetland Determination:* The boundary of Wetland 19.9R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

#### **Wetland 20.0L**

*Size and location:* 0.080-acre wetland west of the NE 124th Street southbound on-ramp to I-405, includes a roadside ditch and extends upslope as a hillside seep.

*Vegetation:* Hillside seep area was recently cleared of vegetation including red alder saplings and Himalayan blackberry. Bare ground and tire ruts present through much of the wetland. Vegetation in the ditch portion of the wetland is dominated by reed canarygrass and soft rush.

*Soils:* The surface horizon of the soil to 11 inches deep is an olive gray (5Y 4/2) silty clay loam with olive brown (2.5Y 4/3) mottles. The lower soil horizon extends to at least 16 inches deep and is a dark greenish gray (Gley 1 4/10Y) silty clay with dark yellowish brown (10YR 4/4) mottles.

*Hydrology:* Saturation at the surface and free water at a depth of 14 inches in the soil pit, areas of standing water throughout.

*Wetland Classification:* Wetland 20.0L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and discharges into a catchbasin.

*Wetland Determination:* The boundary of Wetland 20.L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soils, wetland hydrology indicators, and the presence of upland plant species.

### **Wetland 20.34L**

*Size and location:* 0.279-acre PEM wetland northwest portion of the NE 124th Street interchange; consists of two wetland areas connected by an east-to-west swale near the center of the cloverleaf. The western portion is a previously excavated depression that provides stormwater detention, while the eastern portion is generally flat with some landscaped trees and shrubs. This wetland was previously delineated by Herrera Environmental, Inc., and identified as "Wetland D" and "Wetland E" (USDOT et al., 2002).

*Vegetation:* Western portion dominated by common cattail, soft rush, and red alder; eastern end dominated by reed canarygrass, soft rush, and common reed. The swale connecting each portion is dominated by bentgrass and water foxtail.

*Soils:* Western portion has a deep gleyed layer that is a greenish gray (GLEY 2 5/5 BG) sandy clay loam with cobbles; horizon extends to at least 16 inches deep and contains many distinct dark yellowish brown (10YR 4/6) mottles. This area contained one to 12 inches of standing water. The soil in the eastern portion has an A horizon that extends to at least 16 inches deep and is a dark grayish brown (10YR 4/2) sandy loam with dark yellowish brown (10YR 4/6) mottles. Soils in the swale were similar to those found in the eastern portion of the wetland.

*Hydrology:* Western portion contained 1 to 12 inches of standing water. The eastern portion contained two inches of standing water, and standing water was present throughout the swale.

*Wetland Classification:* Wetland 20.34L is a PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category III wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are flood flow alteration, nutrient and toxicant removal, and general habitat suitability. The wetland receives road runoff, contains dense herbaceous vegetation and a deep depression, and is located near a large PSS/PEM wetland.

*Wetland Determination:* The boundary of Wetland 20.34L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

## **Wetland 20.35L**

*Size and location:* 0.165-acre wetland northwest portion of the NE 124th Street interchange.

This wetland is identified in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998) and was previously delineated by Herrera Environmental, Inc., and identified as "Wetland C" (USDOT et al., 2002).

*Vegetation:* Dominated by bentgrass, reed canarygrass, and Pacific willow.

*Soils:* A layer of very dark grayish brown (2.5Y 3/2) sandy loam extending to 5 inches depth, over a subsoil layer of dark gray (10YR 4/1) sandy clay loam with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Soil saturated to the surface and free water within 10 inches of the surface, with areas of standing water in several portions of the wetland.

*Wetland Classification:* Wetland 20.35L is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

*Wetland Determination:* The boundary of Wetland 20.35L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

## **Wetland 20.4L**

*Size and location:* 2.759-acre wetland near the NE 124th Street interchange. This wetland is identified on NWI maps and is part of a 25-acre PEM/PSS/PFO wetland identified as "Juanita 4" in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998). This wetland contains a tributary of Juanita Creek and provides wildlife habitat. It is surrounded by development and contains little or no upland buffer. Wetland 20.4L was previously delineated by Herrera Environmental, Inc., and identified as "Wetland B" (USDOT et al., 2002).

*Vegetation:* Dominated by reed canarygrass, Pacific willow, common cattail, and black cottonwood.

*Soils:* An A horizon that extends to 5 inches deep and is a very dark grayish brown (10YR 3/2) muck. The B horizon extends to at least 16 inches deep and is a dark grayish brown (2.5Y 4/2) gravelly sandy loam with yellowish brown (10YR 5/6) mottles.

*Hydrology:* Saturated soils and inundated to the surface of the soil pit, with areas of standing water throughout the majority of the wetland.

*Wetland Classification:* Wetland 20.4L is a large PSS wetland that is semi-permanently inundated. It is a Category II wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

*Wetland Functional Assessment:* This wetland provides the majority of functions evaluated under Null et al. (2000). It is part of a large wetland complex with several Cowardin classes, which can store large volumes of water for a long period of time. The wetland is suitable habitat for a variety of wetland-associated animal species.

*Wetland Determination:* The boundary of wetland 20.4L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads and development, and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of saturated soil or hydric soil.

#### **Wetland 21.6L**

*Size and location:* 0.093-acre wetland in the I-405 median, north of Kirkland city limits in unincorporated King County and hydrologically connected to a small stream that flows through a pipe beneath the northbound lanes of I-405.

*Vegetation:* Dominated by small-fruited bulrush, red alder, Himalayan blackberry, and giant horsetail.

*Soils:* An A horizon of very dark brown (10YR 2/2) sandy silt loam extending to 11 inches deep, over a B horizon of very dark greenish gray (Gley 1 3/10Y) sand with dark yellowish brown (10YR 3/6) mottles.

*Hydrology:* Saturated soils at the surface in the soil pit, with water flowing into the soil pit at a depth of 2 inches.

*Wetland Classification:* Wetland 21.6L is a small PFO wetland that is semi-permanently saturated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under King County's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions of the wetland are erosion control and production and export of organic matter. The stream flowing through the wetland is bordered with deciduous trees and shrubs, and herbaceous vegetation.

*Wetland Determination:* The boundary of Wetland 21.6L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by lack of soil saturation or hydric soil, and the presence of upland plant species.

#### **Wetland 21.7L**

*Size and location:* 0.242-acre wetland situated in the I-405 median, north of Kirkland city limits in unincorporated King County.

*Vegetation:* Dominated by Himalayan blackberry and big-leaf maple with some skunk cabbage present in areas of standing water throughout the wetland.

*Soils:* An A horizon composed of a black (7.5YR 2.5/1) silt loam extending to 13 inches deep, over a B horizon of very dark greenish gray (Gley 1 3/5GY) sandy clay loam.

*Hydrology:* Soil was saturated to the surface in the soil pit, with water seeping in at a depth of 7 inches, with areas of standing water in several portions of the wetland.

*Wetland Classification:* Wetland 21.7L is a moderately sized PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under King County's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of the wetland are flood flow alteration, sediment removal, and nutrient and toxicant removal. The wetland is relatively flat and receives road runoff for I-405. Seasonal ponding occurs in wetland.

*Wetland Determination:* The boundary of Wetland 21.7L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to

the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soil and soil saturation, and the presence of upland plant species.

#### **Wetland 21.8L**

*Size and location:* 0.054-acre wetland situated in the I-405 median, located north of Kirkland city limits in unincorporated King County. Wetland is a narrow ditch flowing south, adjacent to I-405.

*Vegetation:* Dominated by velvet grass, bent grass, and soft rush.

*Soils:* A layer of very dark grayish brown (10YR 3/2) gravelly sandy loam extending to 2 inches, over a subsoil layer of dark gray (5Y 4/1) sandy with dark yellowish brown (10YR 4/6) mottles.

*Hydrology:* Soil saturated to surface and free water present at 10-inch depth in soil pit.

*Wetland Classification:* Wetland 21.8L is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under King County's sensitive areas regulations.

*Wetland Functional Assessment:* The principal function of Wetland 21.8L is sediment removal. The wetland contains dense herbaceous vegetation, and receives road runoff from I-405.

*Wetland Determination:* The boundary of Wetland 21.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil.

#### **Sammamish River**

Wetlands in the Sammamish River drainage basin are generally located between the 116th Avenue NE interchange and the northern project boundary (from MP 22.5 to 23.4). Within this section, transportation improvements are proposed for the southbound lanes only.

#### **Wetland 22.5L**

*Size and location:* 4.09-acre wetland south of the Brickyard Park-and-Ride lot. Only 0.025 acres of this large forested wetland is located within the study area. Wetland 22.5L was previously delineated by Parametrix, Inc., and identified as "Wetland D" (Parametrix, 2002).

*Vegetation:* Dominated by red alder, Himalayan blackberry, and willow.

*Soils:* An A horizon extending to at least 18 inches deep with black (10YR 2/1) loamy sand with high organic content. The lower 12 to 18 inches contains riprap rocks that have been buried by sediment and organic matter.

*Hydrology:* Saturation to the surface and free water in the soil pit at a depth of four inches, with standing water in several portions of the wetland and channelized flow.

*Wetland Classification:* Wetland 22.5L is a PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III wetland under Ecology's rating system and a Category III (75-foot buffer) under King County's sensitive areas regulations.

*Wetland Functional Assessment:* The principal functions of this Wetland 22.5L are flood flow alteration and general habitat suitability. The wetland receives road runoff, contains a forested community, and is associated with a stream.

*Wetland Determination:* The boundary of Wetland 22.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

#### **Wetland 22.8L**

*Size and location:* 1.156-acre wetland located north of the NE 160th Street interchange hydrologically connected by a small tributary to the Sammamish River.

*Vegetation:* Dominated by reed canarygrass in an emergent area, and Pacific willow, salmonberry, and black cottonwood in the scrub-shrub and forested areas.

*Soils:* Very dark gray (10YR 3/1) sandy loam extending to below 16 inches depth.

*Hydrology:* Saturated soils at the surface and free water within 2 inches of the surface in the soil pit; low to moderate flow in stream and areas of standing water.

*Wetland Classification:* Wetland 22.8L is a moderate-sized PFO wetland that is semi-permanently inundated. It is a Category III wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Bothell's sensitive areas regulations.

*Wetland Functional Assessment:* Principal functions the wetland are sediment removal, flood flow alteration, nutrient and toxicant removal, and production and export of organic matter. Wetland 22.8L receives road and development runoff, can retain fairly high volumes of water, and contains dense herbaceous plants and deciduous trees and shrubs.

*Wetland Determination:* The boundary of Wetland 22.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil, and the presence of upland plant species.

#### **Wetland 23.2L-DT**

*Size and location:* 0.307-acre wetland located south of East Riverside Drive on the Parcel Property. The wetland borders a small tributary to the Sammamish River.

*Vegetation:* Dominant plants in the wetland include red alder, salmonberry, pacific willow, skunk cabbage, reed canarygrass, and lady fern.

*Soils:* An "A1" horizon of very dark grayish brown (10YR 3/2) silt loam extending to 8 inches over an "A2" horizon of very dark grayish brown (10YR 3/2) silt loam with dark yellowish brown (10 YR 3/6) mottles. A "B" horizon occurring from 13 to 17 inches, consists of dark olive gray (5Y 3/2) sandy with dark olive brown (2.5Y 3/3) mottles.

*Hydrology:* Saturated soil at a depth of 6 inches in the test pit. Areas of seasonal inundation were observed with the wetland.

*Wetland Classification:* Wetland 23.2L is a small PFO wetland that is semi-permanently flooded. It is a Category III wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Bothell's sensitive areas regulations.

*Wetland Functional Assessment:* This wetland provides the majority of functions evaluated under Null et al. (2000). The wetland contains ponded water, receives runoff from nearby development, and contains dense herbaceous and deciduous trees and shrubs.

*Wetland Determination:* The boundary of Wetland 23.2L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded

primarily to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soil and soil saturation, and the presence of upland plant species.

**Table 2-3: Summary of Kirkland Nickel Wetlands**

<b>Wetland ID</b>	<b>Cowardin Classification<sup>1</sup></b>	<b>Wetland Size in Right-of-Way (Square feet)</b>	<b>Local Jurisdiction and Rating</b>	<b>Wetland Category</b>
16.2R	PFO	36,887	Kirkland - 2	II
16.3L	PEM	1,360	Kirkland - 3	IV
16.5L	PEM	2,802	Kirkland - 3	IV
17.1R	PEM	929	Kirkland - 3	IV
17.3R	PEM	2,077	Kirkland - 3	IV
17.7R	PEM	4,168	Kirkland - 3	IV
18.0R	PEM	4,420	Kirkland - 3	IV
18.05R	PFO	5,833	Kirkland - 3	IV
18.06L	PEM	2,060	Kirkland - 3	IV
18.1R	PFO	2,193	Kirkland - 3	IV
18.15R	PEM	57,023	Kirkland - 3	IV
18.2R	PFO	2,976	Kirkland - 3	IV
18.3R	PFO	1,211	Kirkland - 3	IV
18.4R	PEM	1,622	Kirkland - 3	IV
19.27R	PEM	4,590	Kirkland - 3	IV
19.3R	PFO	10,823	Kirkland - 2	III
19.5L	PEM	24,999	Kirkland - 3	IV
19.6R	PEM	2,216	Kirkland - 3	IV
19.6L	PEM	481	Kirkland - 3	IV
19.7R	PSS	10,976	Kirkland - 3	III
19.8L	PEM	14,840	Kirkland - 3	IV
19.9L	PFO	19,310	Kirkland - 3	III
19.9R	PEM	3,811	Kirkland - 3	IV
20.0L	PEM	3,486	Kirkland - 3	IV
20.34L	PEM	12,140	Kirkland - 3	III
20.35L	PEM	7,197	Kirkland - 3	IV
20.4L	PSS	120,199	Kirkland - 2	II
21.6L	PFO	4,039	King County - 3	IV
21.7L	PFO	10,557	King County - 3	IV
21.8L	PEM	2,358	King County - 3	IV
22.5L	PFO	1,084	King County - 2	III
22.8L	PFO	50,352	Bothell - 3	III
23.2L	PFO	13,382	Bothell - 2	III
<b>TOTAL</b>		<b>442,401</b>	<b>(10.156 Acres)</b>	

<sup>1</sup> PEM – Palustrine Emergent; PFO – Palustrine Forested; PSS – Palustrine Scrub-Shrub



### 2.2.3 Impact Summary

During the course of the Kirkland Nickel Project, all or portions of 14 wetlands in the project corridor will be filled or temporarily disturbed. Of the 1.808 acres of wetland impacted in the this corridor (Table 2-4), approximately 1.599 acres will be directly filled or graded to construct road improvements; another 0.191 acres will be temporarily disturbed; and 0.018 acres will be affected indirectly. Table 2-5 summarizes wetland and wetland buffer impacts by local jurisdiction.

#### Direct

Permanent direct impacts would result from WSDOT filling the wetland to construct new facilities; diverting or re-directing surface runoff that would be necessary to support wetland hydrology; or filling such a high percentage of the area of a wetland that the remaining area would not remain wetland or would not provide any beneficial functions.

#### Temporary

Temporary impacts produce short-term loss of wetland functions during construction. They do not, however, result in a permanent loss of wetlands after the project is completed and once disturbed vegetation or wetland hydrology is reestablished. Approximately 0.191 acres of wetlands would be temporarily disturbed during construction activities, including vegetation clearing and the temporary placement of fill material.

The extent of short-term degradation would vary depending on the intensity of the temporary impact. Wetlands where the vegetation is cleared or trimmed would still retain some water quality and quantity function, although at a diminished level. Filled wetlands would provide no beneficial functions until they were restored. Wetlands temporarily impacted during construction would be restored to their pre-existing conditions following the completion of work.

#### Indirect

The project will result in approximately 0.018 acres of indirect impacts to wetlands. Indirect wetland impacts would occur where most of the existing wetland area would be permanently filled such that the remainder is expected to remain wetland, but may not function at the same level as occurred prior to construction.

#### Wetland Buffer Impacts

Buffers temporarily impacted during construction (0.408 acre) would be restored to their pre-existing conditions following the completion of work. Permanent buffer impacts will result in a decrease in area adjacent to wetland areas, which could consequently result in decreased wetland function for the remaining wetlands within the project area after construction. The project will result in permanent decrease of 2.732 acre of buffer area regulated under local land use code (Table 2-5).

### 2.2.4 Functional Evaluation Summary

Wetlands delineated in the Kirkland Nickel Project area were evaluated for functions and values using the *WSDOT Wetland Functions Characterization Tool for Linear Projects* (Null et al., 2000). The WSDOT tool is a qualitative method of assessing wetland functions for wetlands along linear corridor projects, as described previously. The Wetlands Discipline Report (WSDOT, 2005) contains the completed data forms and descriptions for each wetland in the study area. Table 2-6 summarizes the information collected on each data sheet.

**Table 2-4: Summary of Kirkland Nickel Impacted Wetlands  
(in Square Feet)<sup>1</sup>**

<b>Wetland Name/ID</b>	<b>Wetland Size in Right-of-Way</b>	<b>Temporary Wetland</b>	<b>Direct Wetland</b>	<b>Indirect Wetland</b>	<b>Local Jurisdiction and Rating</b>	<b>2004 Ecology Rating</b>
16.3L	1,360	0	1,360	0	Kirkland - 3	IV
16.5L	2,802	0	2,802	0	Kirkland - 3	IV
18.4R	1,622	0	1,622	0	Kirkland - 3	IV
19.27R	4,590	984	3,418	0	Kirkland - 3	IV
19.3R	10,823	0	10,823	0	Kirkland - 2	III
19.5L	24,999	0	24,999	0	Kirkland - 3	IV
19.6R	2,216	0	2,216	0	Kirkland - 3	IV
19.6L	481	0	481	0	Kirkland - 3	IV
19.7R	10,976	1,210	2,778	0	Kirkland - 3	III
19.9R	3,811	0	3,021	790	Kirkland - 3	IV
21.6L	4,039	479	1,850	0	King County - 3	IV
21.7L	10,557	1,334	6,016	0	King County - 3	IV
21.8L	2,358	0	2,358	0	King County - 3	IV
22.8L	50,352	4,317	5,905	0	Bothell - 3	III
<b>Total</b>		<b>8,384</b>	<b>69,649</b>	<b>790</b>		
<b>Acres</b>		<b>0.191</b>	<b>1.599</b>	<b>0.018</b>		

<sup>1</sup> Table includes information for impacted wetlands only. An additional 19 wetlands were delineated within the study area, but will not be affected by the project.

**Table 2-5: Summary of Impacted Wetlands and Buffers per Local Jurisdiction**

<b>Local Jurisdiction</b>	<b>Direct Impacts to Category III Wetlands (acre)</b>	<b>Direct Impacts to Category IV Wetlands (acre)</b>	<b>Total Direct Wetland Impacts (acre)</b>	<b>Total Permanent Buffer Impacts (acre)</b>
Kirkland	0.312	0.916	1.229	1.706
King County	0	0.235	0.235	0.308
Bothell	0.136	0	0.136	0.717
<b>Totals</b>	<b>0.448</b>	<b>1.151</b>	<b>1.599</b>	<b>2.732</b>

**Table 2-6: Summaries of Functions and Values for Impacted Wetlands <sup>1</sup>**

Wetland Identifier	Cowardin Classification	Flood Flow Alteration	Sediment Removal	Nutrient & Toxicant Removal	Erosion Control & Shoreline Stabilization	Production of Organic Matter and its Export	General Habitat Suitability	Habitat for Aquatic Invertebrates	Habitat for Amphibians	Habitat for Wetland-Associated Mammals	Habitat for Wetland-Associated Birds	General Fish Habitat	Native Plant Richness	Educational or Scientific Value	Uniqueness and Heritage
16.3L	PEM		✓		✓	✓									
16.5L	PEM		✓		✓	✓									
18.4R	PEM	✓	✓	✓											
19.27R	PEM	✓	✓	✓	✓	✓	✓								
19.3R	PFO		✓	✓	✓	✓	✓						✓		
19.5L	PEM	✓	✓	✓		✓		✓							
19.6L	PEM		✓	✓											
19.6R	PEM		✓	✓		✓									
19.7R	PSS	✓	✓	✓		✓		✓							
19.9R	PEM	✓	✓	✓		✓									
21.6L	PFO				✓	✓	✓	✓							
21.7L	PFO	✓	✓	✓		✓	✓								
21.8L	PEM		✓			✓									
22.8L	PFO	✓	✓	✓	✓	✓	✓	✓		✓		✓			

<sup>1</sup> A check mark (✓) indicates that the wetland is likely to provide that function or benefit per Null et al. (2000)

Typically, larger wetlands in the study area are located in flat, low-lying areas. The smaller wetlands are most often located in small, closed, topographic depressions, or are hydrologically connected to hillside seeps, or roadside drainage ditches. Because of their size and topographic locations, larger wetlands within the study area are more likely to provide a higher number and higher value of beneficial functions than smaller wetlands. Seventeen of the wetlands within the study area are stormwater facilities or stormwater conveyance swales or ditches. Eleven of these appear to have been constructed on, or are modifications to, pre-existing wetlands.

All of the study area is located within the urban growth area, with most of the study area comprising existing road rights-of-way. All of the wetlands within the study area have been disturbed to some extent by development, including the construction of I-405 and development

in the surrounding area. This has affected the ability of the wetlands to provide the beneficial functions identified by Null et al. (2000).

Less than one-half of the wetlands were found to have the potential to provide value related to stormwater management functions, including: flood flow alternations, sediment removal, nutrient and toxicant removal, and erosion control. Less than one-fourth of the total number of wetlands are likely to provide value related to general habitat, habitat for amphibians, fish, and/or birds, or native plant richness. One wetland (Wetland 20.4L) is likely to provide uniqueness or heritage value. Two wetlands (Wetland 20.4L and Wetland 22.5L) are likely to provide educational or scientific value. Two of the wetlands are likely to provide general value as fish habitat (Wetland 20.4L and Wetland 22.8L).

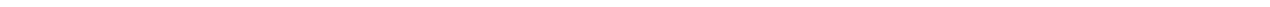
### Mitigation for Lost Functions

The Aquatic Resources Mitigation Act (RCW 90.74) makes clear that it is the policy of the state to authorize innovative mitigation measures by requiring state regulatory agencies to consider mitigation proposals for infrastructure projects that are timed, designed, and located in a manner to provide equal or better biological functions and values compared to traditional on-site, in-kind mitigation proposals.

Overall, the wetlands within the study area are lower value wetlands related to habitat functions because of their proximity to, and association with I-405. Their primary function is to improve water quality and abate the effects on downstream waters from stormwater flows. Therefore, the temporary and permanent impacts to wetlands in the project area will primarily result in a loss of inherent the stormwater management functions provided by these wetlands. Because of the implementation of stormwater Best Management Practices as part of the project, stormwater quality will be significantly improved for the corridor as a whole, but wetland loss will reduce the flood water desynchronization, sediment removal, nutrient and toxicant removal, and erosion control functions provided by the affected wetlands. The project will also result in a reduction of habitat functions provided by wetland areas, and those habitat functions will not be mitigated through stormwater treatment and detention or other water quality best management practices. Therefore compensatory wetland mitigation will be needed primarily for impacts to wetland habitat.

WSDOT will propose to compensate for the losses in wetland habitat through off-site wetland habitat creation and enhancement. The proposed off-site habitat mitigation sites will elevate habitat within regionally significant wildlife habitat areas, and maintain overall habitat functions within the general project vicinity. The habitats provided by the wetlands that will be affected by the project are of low quality. Rather than replicate the existing low-quality functions at a new location or locations, WSDOT proposes mitigation that would maximize bird, insect and small mammal habitat opportunities and provide greater habitat functions over the long term than presently occur along the I-405 corridor.

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## 3.0 Proposed Compensatory Mitigation

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The Kirkland Nickel Project will result in unavoidable impacts to 1.808 acres of wetlands. The effects caused by these impacts will be offset through off-site compensatory mitigation. To account for unavoidable impacts to wetlands, WSDOT will provide compensatory mitigation to offset anticipated impacts to wetland functions and values. The mitigation will also offset temporal losses to wetland and buffer function that will occur between the time of impact and when the replacement wetlands will be fully established.

### 3.1 General Goals of Mitigation Program

As part of the WSDOT right-of-way acquisition process for the Kirkland Nickel Project, WSDOT will fund, plan, design, construct, and monitor the proposed wetland mitigation program and individual projects necessary to compensate for unavoidable impacts to wetland functions and values described in Section 2. To meet these requirements WSDOT assessed five compensatory mitigation sites. These are described in the *Kirkland Nickel Project Conceptual Wetland Mitigation Discipline Report* (WSDOT, 2004). The initial list of sites included potential areas recommended by either the City of Kirkland or the City of Bothell during interagency coordination meetings. Most of the mitigation sites presented by each respective jurisdiction were identified as being long-planned projects within their jurisdictions in need of a sponsor.

Each of the five potential wetland mitigation sites were evaluated based on their ability to meet the following general goals:

- To provide an opportunity to achieve a net gain of habitat functions through actions that would not occur naturally in a reasonable time frame,
- To have a high likelihood of success,
- To pose no risk to alteration of the hydro-geomorphic setting,
- To provide space to enhance and maintain buffer zones around the mitigation sites where appropriate,
- To provide benefits to a higher category wetland, and
- To provide for a “no net loss” of area collectively for the project as a whole.

#### 3.1.1 Mitigation Site Evaluation

WSDOT developed preliminary conceptual layouts for each of the five initial mitigation sites as described in the *Kirkland Nickel Project Conceptual Wetland Mitigation Discipline Report* (WSDOT, 2004). WSDOT selected three of the five sites for further design and evaluation based on each site’s ability to meet the general goals of the mitigation program and several other factors including ownership, land acquisition, construction cost, design flexibility, and the ability to achieve long-term benefits. The three sites ultimately selected for mitigation are identified on Figure 1 and are described in this study as:

- Forbes Lake West Site,
- Forbes Lake East Site, and
- Thrasher’s Corner Site.

Existing conditions of each site are shown on Figures 2, 3, and 4.

### 3.1.2 Mitigation Ratios and No Net Loss

#### No Net Loss

The proposed project will affect an estimated 1.808 acres of total wetland area. Of this total, 1.599 acres will be directly impacted and permanently lost as a result of fill necessary for construction. The mitigation program will provide at least 1.599 acres of new wetland to meet the “no-net-loss” required per both federal and Washington State executive orders (Executive Order 11990; Washington State Executive Order 90-04). WSDOT’s mitigation program will assure no net less loss of area within local jurisdictions where it is feasible to do so. Since many of the current wetland functions provided by the impacted wetlands will be mitigated through the stormwater treatment designs for the project, using acreage alone to evaluate no-net loss is a conservative approach. Habitat functions will be increased with this approach, providing a net gain in wetland functions.

#### Mitigation Ratios

This section includes reference to the mitigation ratios included in the 1993 Implementing Agreement. The range of mitigation for direct wetland impacts proposed by WSDOT for the Kirkland Nickel Project is summarized in Table 3-1.

**Table 3-1: Kirkland Nickel Wetland Direct Impacts and Proposed Mitigation Summary**

Wetland Name	Wetland Impact (acre)	Impacted Wetland Category	Mitigation Wetland Category	Mitigation Ratio per IA <sup>1</sup>	Creation Need per IA <sup>1</sup> (acre)	Creation Provided (acre)	Difference (acre)	Location (site)
16.3L	0.031	IV	II	1.25:1	0.039	0.040	0.001	Forbes Lake East
16.5L	0.064	IV	II	1.25:1	0.080	0.083	0.003	Forbes Lake East
18.4R	0.037	IV	II	1.25:1	0.046	0.048	0.002	Forbes Lake East
19.27R	0.079	IV	II	1.25:1	0.099	0.103	0.004	Forbes Lake East
19.3R	0.248	III	II	1.5:1	0.372	0.446	0.074	Forbes Lake West
19.5L	0.574	IV	II	1.25:1	0.718	0.746	0.028	Forbes Lake East
19.6L	0.011	IV	II	1.25:1	0.014	0.014	0.000	Forbes Lake East
19.6R	0.051	IV	II	1.25:1	0.064	0.066	0.002	Forbes Lake East
19.7R	0.064	III	II	1.5:1	0.096	0.115	0.019	Forbes Lake West
19.9R	0.069	IV	II	1.25:1	0.086	0.090	0.004	Forbes Lake East
21.6L	0.043	IV	II	1.25:1	0.054	0.056	0.002	Forbes Lake East
21.7L	0.138	IV	II	1.25:1	0.173	0.179	0.006	Forbes Lake East
21.8L	0.054	IV	II	1.25:1	0.068	0.070	0.002	Forbes Lake East
22.8L	0.136	III	II	1.5:1	0.204	0.245	0.041	Varies <sup>2</sup>
<b>I-405 Total</b>	<b>1.599</b>				<b>2.113</b>	<b>2.301</b>	<b>0.188</b>	
Sound <sup>3</sup> Transit	0.009	IV	II	1.25:1	0.012	0.012	0.000	Forbes Lake West
124 <sup>th</sup> to SR 522 <sup>4</sup>	To be determined	To be determined	To be determined	To be determined	0.074	0.074	Not Applicable	Thrasher's Corner
<b>Total</b>	<b>1.608</b>				<b>2.199</b>	<b>2.387</b>	<b>0.188</b>	

<sup>1</sup> Based on the maximum range identified in Appendix E of the 1993 Implementing Agreement

<sup>2</sup> Thrasher's Corner (0.136 acre - Creation) - Forbes Lake East (0.109 acre - Creation)

<sup>3</sup> WSDOT is providing mitigation at Forbes Lake West for previously unknown wetland impacts occurring as a result of the Sound Transit Kirkland Direct Access Ramp Project. This project was permitted separately from the Kirkland Nickel Project.

<sup>4</sup> WSDOT is creating an additional 0.074 acre of wetland creation at the Thrasher's Corner site for future, and as yet uncategorized wetland impacts, as a result of the 124<sup>th</sup> to SR 522 Northbound Lane Braid project. This project will be permitted separately from the Kirkland Nickel Project.

### 3.1.3 Site-Specific Mitigation Goals

The proposed wetland impacts occur within three distinct local jurisdictions. Because of the desire to account for impacts within each jurisdiction in the simplest manner, the mitigation goals are identified based on which impacts occur in each jurisdiction. This has been done to account for the need to meet local, state, and federal mitigation requirements and final negotiated replacement ratios.

#### 1993 Implementing Agreement

The following is a summary of the mitigation proposed within each jurisdiction to meet the requirements of the 1993 Implementing Agreement. A summary of required and proposed wetland mitigation on each site is included in Table 3-2.

- Provide a minimum of 1.202 acres of Category II wetland creation at the Forbes Lake East site as mitigation for 0.925 acre of impacts to Category IV wetlands located within the City of Kirkland. This exceeds the 1.25:1 creation mitigation ratio identified in the 1993 Implementing Agreement.
- Provide a minimum of 0.561 acre of Category II wetland creation at the Forbes Lake West site as mitigation for 0.312 acre of impacts to Category III wetlands located within the City of Kirkland. This exceeds the 1.5:1 creation mitigation ratio identified in the 1993 Implementing Agreement.
- Provide a minimum of 0.305 acre of Category II wetland creation at the Forbes Lake East site as mitigation for 0.235 acre of impacts to Category IV wetlands located within unincorporated King County. This exceeds the 1.25:1 creation mitigation ratio identified in the 1993 Implementing Agreement.
- Provide a minimum of 0.109 acre of Category II wetland creation at the Forbes Lake East and 0.136 acre of Category II wetland creation at the Thrasher's Corner Site as mitigation for 0.136 acre of impacts to Category III wetlands located within the City of Bothell. The total wetland creation area at both sites totals 0.254 acre. This exceeds the 1.5:1 creation mitigation ratio identified in the 1993 Implementing Agreement.
- Provide a minimum of 0.074 acre of Category II wetland creation at the Thrasher's Corner Site as mitigation for anticipated future impacts anticipated from the 124<sup>th</sup> to SR 522 Northbound Lane Braid project.

#### Additional Mitigation for Temporal Loss and Decreased Function From Buffer Impacts

The following is a summary of the mitigation proposed within each jurisdiction to compensate for decreased wetland function from impacts to wetland buffers as a result of the project. A summary of additional mitigation on each site is included in Table 3-2.

- Provide a minimum of 0.051 acre of upland buffer enhancement at the Forbes Lake West site and provide a minimum of 1.435 acres of upland buffer enhancement at the



Forbes Lake East site (1.486 acres total) as mitigation for 2.014 acres of wetland buffer impacts to wetlands located within the City of Kirkland and unincorporated King County.

- Provide a minimum of 0.717 acre of Category II wetland enhancement at the Thrasher's Corner Site as mitigation for 0.717 acre of wetland buffer impacts to wetlands located within the City of Bothell.
- Provide a minimum of 0.864 acre of Category II wetland enhancement at the Forbes Lake West site as mitigation for temporal losses and losses to wetland function as a result of temporary, indirect, and wetland buffer impacts from the project.
- Provide a minimum of 0.572 acre of Category II wetland enhancement at the Forbes Lake East site as mitigation for temporal losses and losses to wetland function as a result of temporary, indirect, and wetland buffer impacts from the project.

**Table 3-2: Summary of Required and Proposed Additional Wetland Mitigation**

Mitigation Site	Mitigation Type	Mitigation Required (acre)	Mitigation Provided (acre)
Forbes Lake West	Creation – Category 2	0.536	0.561
	Enhancement – Category 2 <sup>1</sup>		0.864 <sup>1</sup>
	Preservation – Category 1 <sup>1</sup>		0.744 <sup>1</sup>
	Upland Habitat Enhancement		0.051 <sup>1</sup>
Forbes Lake East	Creation – Category 2	1.441	1.616
	Enhancement – Category 2 <sup>1</sup>		0.572 <sup>1</sup>
	Upland Habitat Enhancement		1.486 <sup>1</sup>
Thrasher's Corner	Creation – Category 2	0.136	0.136
	Creation – 124 <sup>th</sup> to SR 522 Northbound Braid	TBD	0.074 <sup>2</sup>
	Enhancement – Category 2 <sup>1</sup>		0.717 <sup>1</sup>
	Preservation – Category 2 <sup>1</sup>		3.224 <sup>1</sup>
	Upland Habitat Enhancement		none available
<b>Totals</b>	<b>Creation</b>	<b>2.113</b>	<b>2.387</b>
	<b>Enhancement</b>		<b>2.152</b>
	<b>Preservation</b>		<b>3.968</b>
	<b>Upland Habitat Enhancement</b>		<b>1.537</b>

<sup>1</sup> Proposed in addition to compensatory wetland creation ratios stated in the 1993 Implementing Agreement

<sup>2</sup> Additional wetland creation that will be allocated to the 124<sup>th</sup> to SR 522 Northbound Braid (in progress).

### **3.2 Ultimate Category of Wetland and Number of Years to Achieve**

The WSDOT EPM specifies that mitigation plans should identify the ultimate category of the wetland created. This information, combined with the number of years to achieve success, is used to establish appropriate monitoring requirements. The ultimate category of wetland and the anticipated number of years to achieve are described individually for the Forbes Lake West, Forbes Lake East, and Thrasher's Corner mitigation sites in Appendix A, Appendix B, and Appendix C, respectively.

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## 4.0 Mitigation Area Background Information

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Appendices A, B, and C each includes a discussion of the following elements: rationale for choice, specific location of each site, ownership information, land use, ecological setting, descriptions of existing wetlands, a discussion of existing vegetation including problematic species, streams and other aquatic resources, soils, and wildlife or domestic animal use.

Descriptions of each site are included in separate appendices to this report as follows:

Appendix A – Forbes Lake West

Appendix B – Forbes Lake East

Appendix C – Thrasher's Corner

An overview graphic of each mitigation layout is provided as follows:

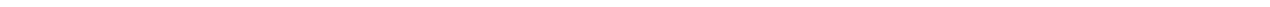
Figure 5 – Forbes Lake West

Figure 6 – Forbes Lake East

Figure 7 – Thrasher's Corner

Site-specific design and Construction Documents are included in Appendix D.

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## 5.0 Mitigation Strategy

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To facilitate the complete review of each mitigation area, the mitigation strategies for each site are included in separate appendices to this report as follows:

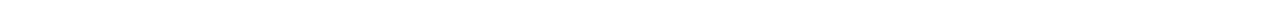
Appendix A – Forbes Lake West

Appendix B – Forbes Lake East

Appendix C – Thrasher's Corner

Each appendix includes a discussion of the landscape position of each site, descriptions of work, hydrology sources, expected seasonal water fluctuations, soil preparation, and vegetation community descriptions.

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## 6.0 Construction and Planting Schedules

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The complete review of the construction and planting schedules for each site are included in Appendix D as follows:

### Forbes Lake West

- Sheet 1 of 12 – Existing Conditions
- Sheet 2 of 12 – Proposed Grading Plan
- Sheet 3 of 12 – Temporary Erosion and Sedimentation Control (TESC) Plan
- Sheet 4 of 12 – Planting Plan
- Sheet 9 of 12 – Typical Cross Sections
- Sheet 10 of 12 – Planting and Habitat Feature Details
- Sheet 11 of 12 – TESC Details
- Sheet 12 of 12 – TESC Notes

### Forbes Lake East

- Sheet 5 of 12 – Existing Conditions
- Sheet 6 of 12 – Proposed Grading Plan
- Sheet 7 of 12 – TESC Plan
- Sheet 8 of 12 – Planting Plan
- Sheet 9 of 12 – Typical Cross Sections
- Sheet 10 of 12 – Planting and Habitat Feature Details
- Sheet 11 of 12 – TESC Details
- Sheet 12 of 12 – TESC Notes

### Thrasher's Corner

- Sheet 1 of 6 – Existing Conditions Plan
- Sheet 2 of 6 – TESC Plan
- Sheet 3 of 6 – Mitigation Layout
- Sheet 4 of 6 – Grading, Demolition, and Habitat Structures Plan
- Sheet 5 of 6 – Planting Plan and Details
- Sheet 6 of 6 – Sections and Details

## 6.1 Monitoring Plan

To ensure success of the mitigation plans, a ten-year monitoring and management program will be implemented. The objective of this mitigation plan is to achieve the prescribed standards of success unless WSDOT, in consultation with the regulatory agencies, establishes replacement standards based on circumstances and conditions observed at the mitigation site.



The installed vegetation communities will be monitored during Years 1, 2, 3, 5, 7, and 10. Prior to the first monitoring visit, as-built plans will be prepared to document the implementation of the mitigation plans. Any minor changes to the approved mitigation plans that are required by field conditions present during plan implementation must be documented on the As-Built Plans. The monitoring period begins once the as-built plans have been approved.

Monitoring shall take place during the summer or early fall, prior to leaf drop (except for piezometer readings as detailed below). The following information will be collected and recorded:

1. Survival of planted trees and shrubs will be assessed in monitoring Year 1.
2. Indicators of wetland hydrology identified in the *Washington State Wetlands Identification and Delineation Manual* to qualitatively evaluate the presence of wetland hydrology in monitoring Year 1.
3. Percent cover of woody species will be estimated in Year 5. Native, emergent (FAC or wetter) plant species aerial cover will be estimated in the emergent wetland zone in Year 3. Aerial cover estimates for native trees and shrubs in the forested and scrub-shrub wetland zones will be completed in Years 5, 7, and 10.
4. Aerial cover estimates for state-listed noxious weeds will be completed in Years 1, 2, 3, 5, 7, and 10.
5. Soils will be described in the first and last years of monitoring.
6. Piezometer monitoring will be done six times during the first growing season: February 15, March 1, March 15, April 1, April 15, and May 1.
7. Wetland limits will be delineate during the spring of Year 10 to verify the presence of wetland hydrology.
8. Photographic documentation from photo points will be identified on the as-built plans.
9. Documentation of incidental wildlife sightings or signs.
10. Report of intrusions, vandalism, or other actions that impair the intended functions of the mitigation areas.
11. Recommendations for maintenance or repair of the mitigation areas.

Following each year's monitoring visit, a report will be prepared detailing the findings of the visit. This report will be submitted by March 31 of the subsequent year.

A total of six reports (following Years 1, 2, 3, 5, 7, and 10) will be prepared. A brief qualitative evaluation will occur in the off-years (Years 4, 6, 8, and 9). Unless particular issues are identified, the results from off-year monitoring will be summarized in the following formal reporting cycle. If issues are identified during off-years, they will be addressed immediately triggering potential contingency actions (see below). Standards for success for the above criteria are included in the appendices of this report, particular to each mitigation site.

## 6.2 Contingency Plans

If there is a significant problem with the mitigation area meeting its performance standards, a contingency plan will be developed. Contingency plans may include, but are not limited to:

- Plant substitutions of type, species, size, quantity, and/or location;
- Additional plant installation to address survival or cover problems;

- Watering or providing irrigation during unseasonably dry periods;
- Weeding and additional plant installation to address invasive weed cover;
- Regrading or modifications to hydrologic sources to address problems with wetland hydrology;
- Erosion control;
- Providing fencing or plant guards around plants to prevent animal damage;
- Providing fencing to prevent vandalism or other damage caused by humans; and
- Planting trees and shrubs in emergent wetland areas if invasive weed control activities are not successful.

Contingency plans shall be submitted by December 31 of the year in which deficiencies are discovered.

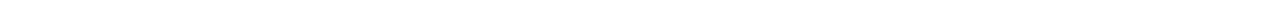
### **6.3 Mitigation Site Management**

The mitigation areas will be actively managed for ten years following completion of construction. This will include at least one management (or, management and maintenance) visit per year for ten years following implementation of the restoration plan. Site management visits will occur during the growing season in May through July. The following tasks will be completed during these visits:

- The planting area will be weeded by hand to remove any new shoots of non-native and/or invasive vegetation within a 2-foot radius of each installed plant;
- Installed plantings must be watered with 2 inches of water during the Year 1 management visit. Further, if plants appear to be stressed due to drought, watering frequencies should be increased to once per week from July through September;
- During the Year 2 management visit, tree stakes shall be removed;
- Additional management visits may also be required to respond to other monitoring recommendations.

Following completion of the prescribed monitoring and site management periods, the mitigation sites will be protected from development or other alteration in perpetuity.

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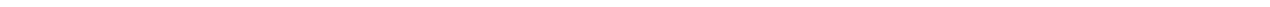


## 7.0 References

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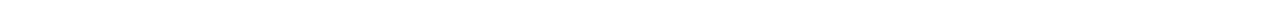
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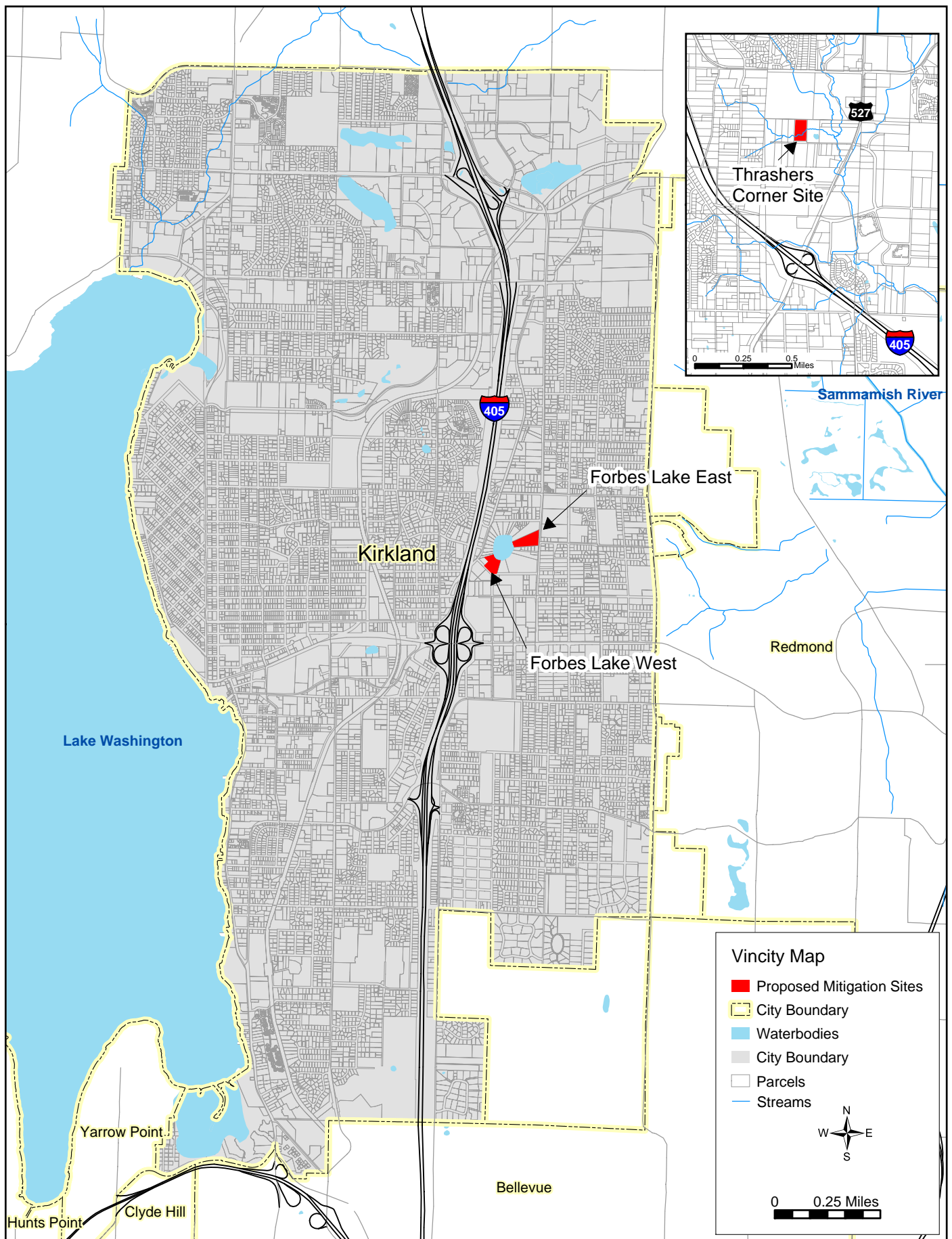
## 8.0 Figures

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Source: WSDOT 2004; King County, 2003; Kirkland, 2003. L:\NATURAL SCIENCES\2002\22116.8 WSDOT Mitigation development\Figures & Aerial photos\GIS\vicinity.mxd Last updated 9/15/2004



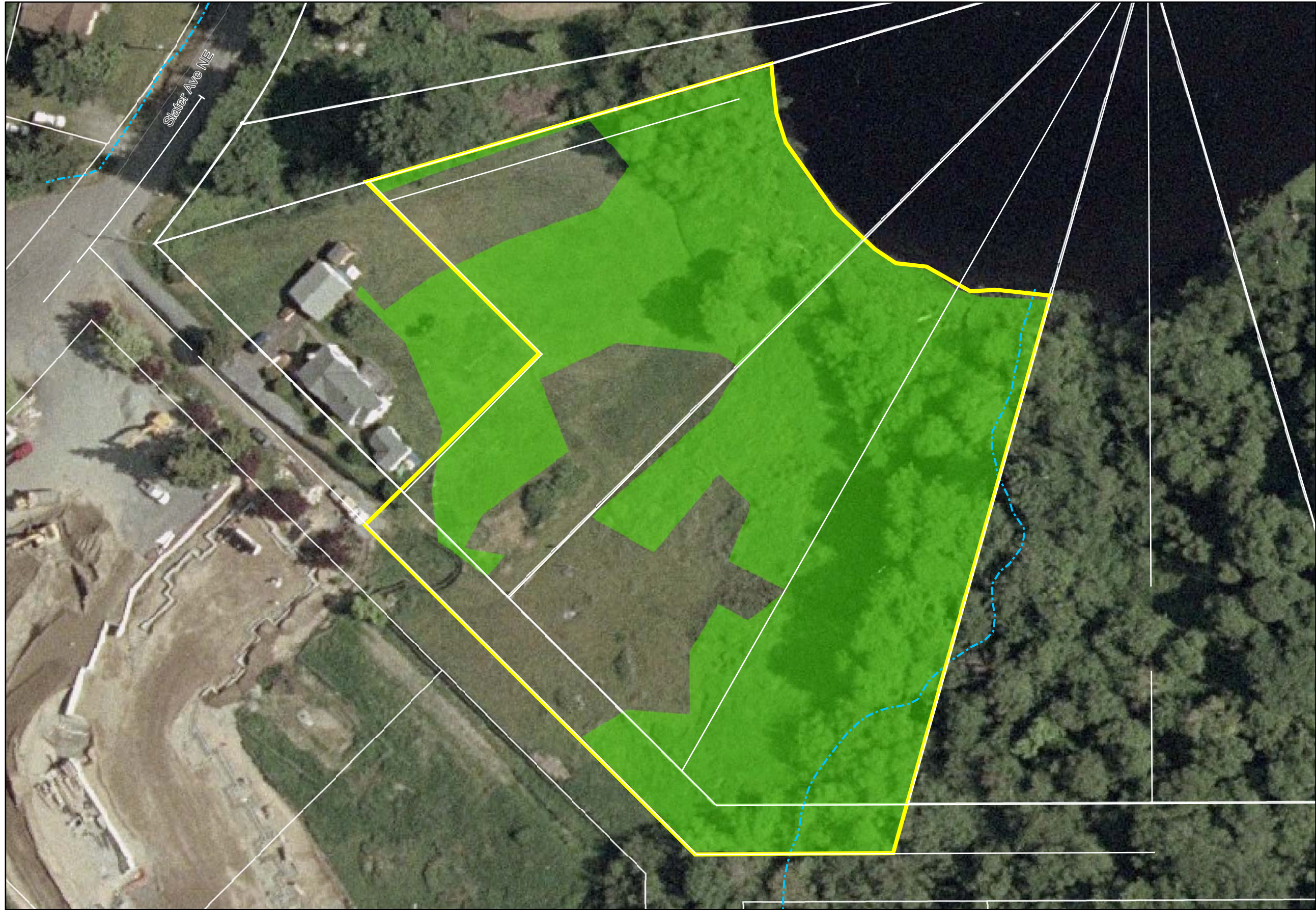
**Vicinity Map**  
**Figure 1**







<LIN leading="7"><FNT name="Arial" size="6">Source: WSDOT, 2004; Kirkland, 2003; King County, 2003; USGS, 2002 | L:\NATURAL SCIENCES\2002\22116.8 WSDOT Mitigation Development\FiguresandAerial photos\GIS\Forbeslakeeast.mxd | Last Updated : 12/16/04; DNE

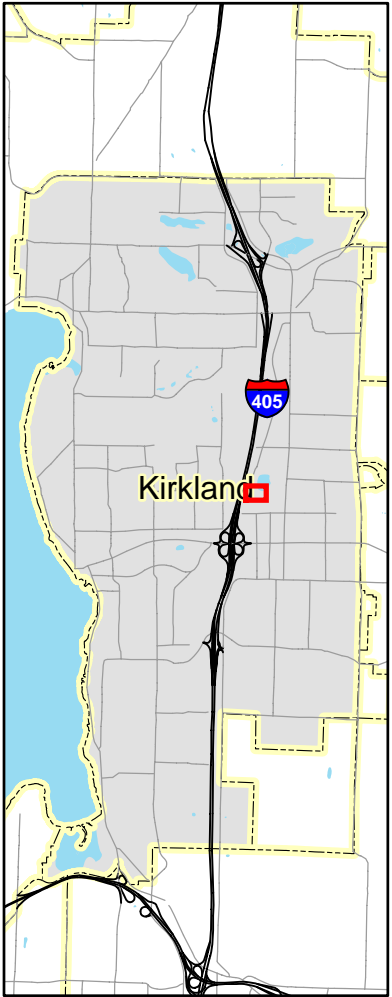


Existing Conditions

- Approximate Site Boundaries
- Existing Wetland
- Streams/Drainage
- Plat / ROW Boundary



1 inch equals 60 feet



Forbes Lake West - Existing Conditions

FIGURE 2







<LIN leading="7"><FNT name="Arial" size="6">Source: WSDOT, 2004; Kirkland, 2003; USGS, 2002; King County, 2003; USGS, 2002; L:\NATURAL SCIENCES\2002\22116.8 WSDOT Mitigation Development\FiguresandAerial photos\GIS\forbeslake\_east.mxd | Last Updated: 12/16/04; DNE



Existing Conditions

- Approximate Site Boundaries
- Existing Wetland
- Streams/Drainage
- Plat / ROW Boundary



1 inch equals 60 feet



Forbes Lake East - Existing Conditions

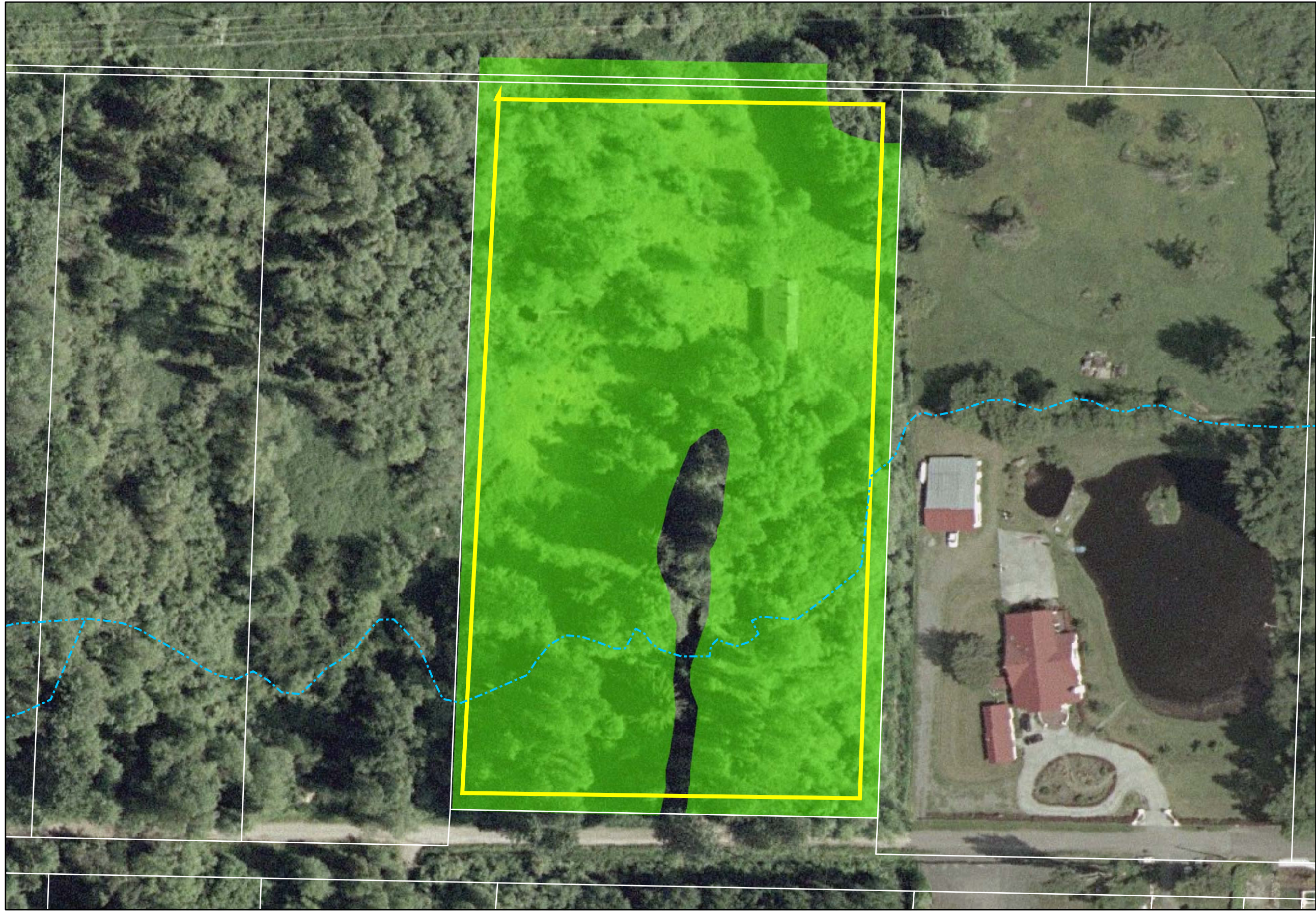
FIGURE 3







<LIN leading="7"><FNT name="Arial" size="6">Source: WSDOT, 2004; Kirkland, 2003; USGS, 2002 | L:\NATURAL SCIENCES\2002\22116.8 WSDOT Mitigation Development\Figures and Aerial photos\GIS\Thrashers.mxd | Last Updated: 12/16/04; DNE



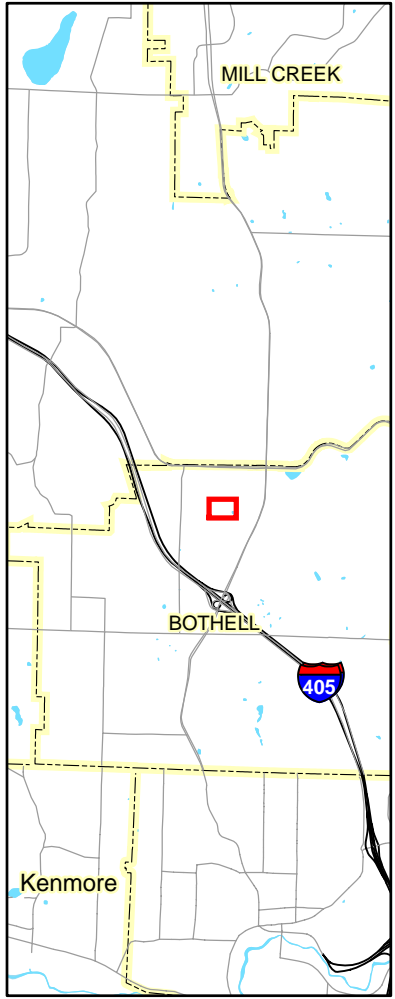
Existing Conditions

- Approximate Site Boundaries
- Existing Wetland
- Streams/Drainage
- Plat / ROW Boundary

N

1 inch equals 80 feet

0 80 Feet



Thrashers Corner Site - Existing Conditions

FIGURE 4





EXISTING WETLAND (EXTENDS OFF SITE TO NORTHWEST)

SLATER AVE NE

RC 0.0 W, 0.8 N

PROPOSED BUFFER ENHANCEMENT

PROPOSED WETLAND CREATION

0.2 NNW OF LINE

RC

NEW ORDINARY HIGH WATER MARK 247.3

EXISTING ORDINARY HIGH WATER LINE 247.3

LAKE KIRKLAND (FORBES LAKE)

EXISTING WETLAND PROPOSED ENHANCEMENT

IE=255.97

IE=257.65

10" PINE

4" PVC

PLANTER

18" PINE

IE=258.29

IE=257.79

GRAVEL

ASPHALT

GARAGE

PL

CONC.

SEPTIC TANK LID

HOUSE

DECK

DECK

COTTAGE

DECK

250

WASHINGTON ST.

4" WOOD FENCE

IE=253.42

IE=253.25

PROPOSED BUFFER ENHANCEMENT

PROPOSED WETLAND CREATION AREA

SITE BOUNDARY

EXISTING WETLAND (OFF SITE)

EXISTING WETLAND PROPOSED ENHANCEMENT


EXISTING WETLAND (EXTENDS OFF SITE TO EAST)

NE 92nd ST.

60% SUBMITTAL

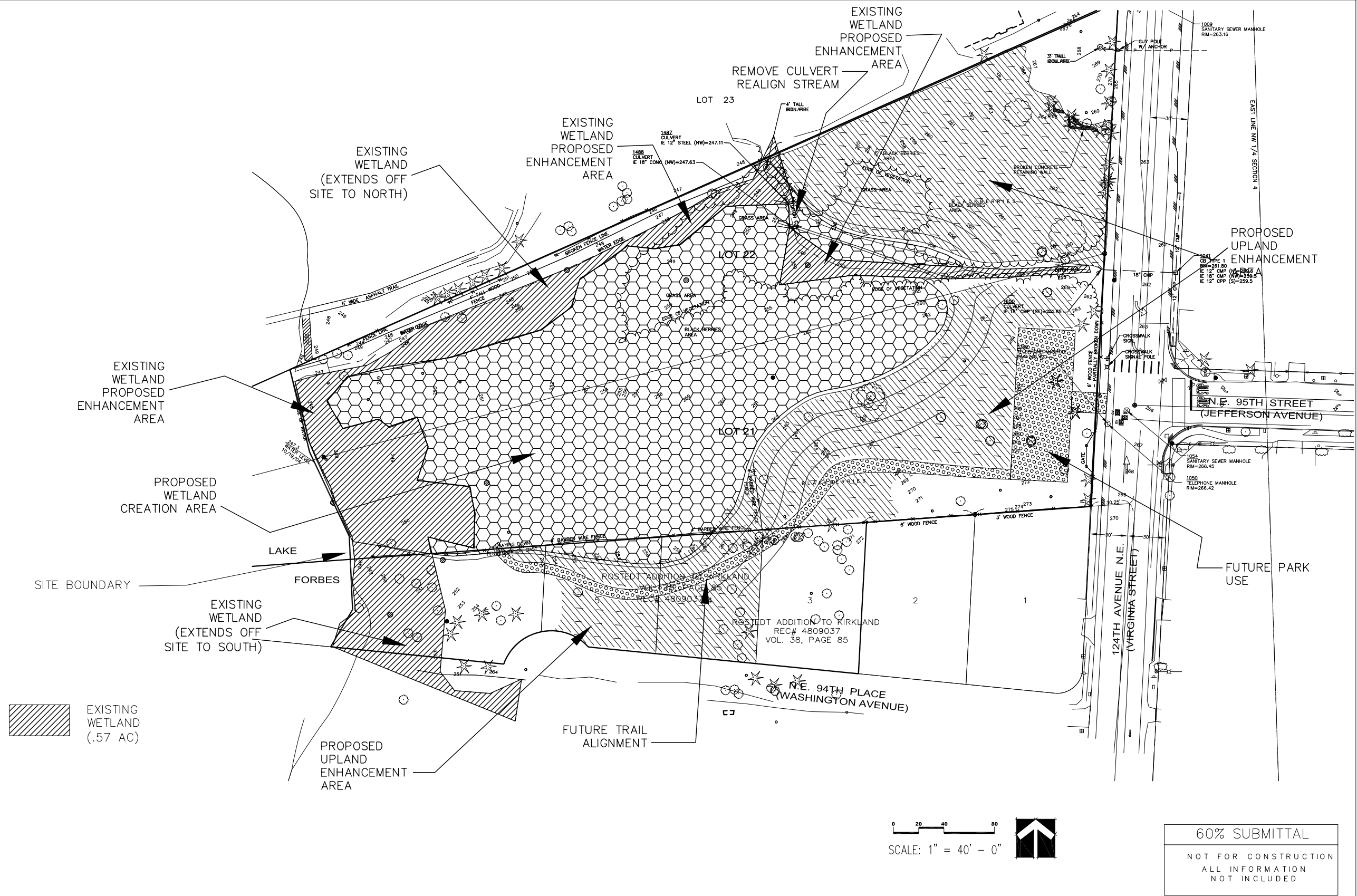
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ALL INFORMATION  
NOT INCLUDED


SCALE: 1" = 30' - 0"

FILE NAME				REGION NO.		STATE		FED.AID PROJ.NO.				I-405, SR 520 TO SR 522 KIRKLAND NICKEL PROJECT		FIGURE	
TIME															
DATE 2/10/05		BASED ON WSDOT 2-11-05 COMMENTS		2/16/05		me		10		WASH					
PLOTTED BY		GENERAL REVISIONS		4/20/05		me									
DESIGNED BY m. epstein		PER REVIEW COMMENTS 4-27-05		5/2/05		me		JOB NUMBER							
ENTERED BY		PER HPA REVIEW COMMENTS 5-5-05		5/18/05		me									
CHECKED BY								CONTRACT NO.		LOCATION NO.					
PROJ. ENGR.															
REGIONAL ADM.		REVISION		DATE		BY						DATE P.E. STAMP BOX		DATE P.E. STAMP BOX	
												FORBES LAKE WEST - MITIGATION LAYOUT		5	







FILE NAME				REGION NO.		STATE	FED.AID PROJ.NO.			DATE	P.E. STAMP BOX	DATE	P.E. STAMP BOX		I-405, SR 520 TO SR 522 KIRKLAND NICKEL PROJECT	FIGURE
TIME				NO.												
DATE 2/10/05	BASED ON WSDOT 2-11-05 COMMENTS	2/16/05	me	10	WASH											
PLOTTED BY	GENERAL REVISIONS	4/20/05	me													
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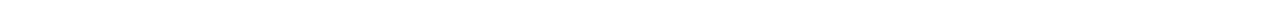




**Appendix A**  
**Forbes Lake West**  
**Description of Mitigation Sites**  
**and**  
**Mitigation Strategy**

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# **Description of Mitigation Site – Forbes Lake West**

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## **Rationale for Choice**

The Forbes Lake West site will provide mitigation in the form of wetland creation, wetland enhancement, and wetland preservation. This disturbed site was selected due to its proximity to larger adjacent high quality wetlands. Further, wetland mitigation at this location will address City concerns and needs by providing flood storage benefits to alleviate flooding problems around Forbes Lake.

## **Location**

The Forbes Lake West site is located in the City of Kirkland in Township 25 North, Range 5 East, Section 4. The parcels that compose the Forbes Lake West site are adjacent to Forbes Lake in the City of Kirkland. Combined, they cover a total of 2.9 acres and are located on the south shoreline of the lake and east of Slater Avenue.

## **Ownership**

The Forbes Lake West site is composed of two parcels in private ownership. The easternmost parcel is undeveloped. The westernmost parcel currently contains a single-family residence. The single-family development will be short platted and will be retained by the current owners. WSDOT is currently in the process of acquiring the parcels for this site.

## **Land Use on and Adjacent to the Site**

A single-family residence is located in the southern portion. It appears that nonnative fill material has been placed on portions of the property in the past 10 to 15 years. Single-family residential development occurs to the west and northwest of the site. A newly constructed retirement condominium development is located to the southwest of the site. An undeveloped forested parcel owned by the City of Kirkland is located to the southeast of the site.

## **Ecological Setting**

The site is part of a much larger wetland system associated with Forbes Lake. It is located in the upper watershed of the Forbes Lake drainage, a tributary to Lake Washington, and most of the site is wetland that is associated with Forbes Lake. Wetland extends off site to the north and northwest, south and southeast.

## **Wetlands**

Wetlands were delineated on this site on September 1 and 2, 2004, using methodology from the *Washington State Wetlands Identification and Delineation Manual* (Washington Department of Ecology 1997) and the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987). Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the manuals were determined to be wetland.

The wetland on this site is considered a Class I wetland according to City of Kirkland regulations and a Category II wetland according to the *Washington State Wetland Rating System for Western Washington, Revised* (Hruby, 2004).



## Existing Vegetation

The Cowardin classification is used to classify wetlands based on plant associations and water regime (Cowardin et al., 1979). According to this system, the wetland on the Forbes Lake West site is primarily palustrine emergent (PEM) wetland. Small palustrine scrub-shrubs (PSS) are found adjacent to the lake in the northwest corner of the site. A larger palustrine forested (PFO) wetland occurs along the southeastern property boundary and extends offsite. Emergent wetland areas are dominated by bentgrass, velvetgrass creeping buttercup, and reed canarygrass. Because the wetland extends off the property in all directions, there is little upland wetland buffer on-site.

## Streams and Other Water Resources

A small headwater tributary to Forbes Lake is located within PFO areas in the southeastern portion of the site. The forested area associated with the inlet stream will not be affected by the proposed mitigation. Intermittent channelized drainage parallels the northern site boundary. This drainage will be redirected through features on the mitigation site to provide a more natural configuration.

## Soils

Soil investigation found native soils with hydric indicators on a portion of the site and nonnative hydric soils on another portion of the site. Native soils have an A horizon that extends to 11 inches deep and is a very dark brown (10YR 2/2) or black (10YR 2/1) silt loam. The B horizon extends from 11 inches to at least 16 inches and is a dark gray (2.5Y 4/1) clay with oxidized roots present or a black (10YR 2/1) peaty silt loam. Nonnative soils were found on both properties in irregularly shaped areas. These soils have an A horizon that extends to 13 inches deep and is a dark grayish brown (2.5Y 4/2) gravelly sandy loam with dark yellowish brown (10YR 4/6) mottles. The B horizon extends from 13 inches to at least 27 inches and is a dark gray (5Y 4/1) clay also with dark yellowish brown (10YR 4/6) mottles. Gravels, cobbles, and chunks of asphalt were found throughout the profile, indicating nonnative fill. Soils across the site were moist during the time of field visit due to the late summer dry conditions.

## Existing Wildlife or Domestic Animals

No domestic animals are present on the site. No specific priority species are listed on the site (Washington State Department of Natural Resources, 2004). Resident cutthroat have been identified in Forbes Lake drainage and are listed as Priority Resident Fish (Washington State Department of Natural Resources, 2004). Incidental observations of wildlife at the Forbes Lake West mitigation site during the wetland delineation and design phases have included song birds and waterfowl on Forbes Lake.

## Mitigation Strategy – Forbes Lake West

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### Landscape/Watershed Position of Proposed Site

Forbes Lake is the headwaters for Forbes Creek, a direct tributary to Lake Washington, and the Forbes Lake West site is adjacent to Forbes Lake.

### General Description of Mitigation

The two primary wetland creation areas (totaling 0.8 acre) are two lobes of upland that are surrounded by wetland areas. The general concept is to create wetlands within these upland

areas that, combined with enhancement of the surrounding degraded wetlands, would match native wetland habitat areas east and west of the site. The large quantity of degraded wetland on the site provides a good opportunity to increase functions and values on the site by planting native shrub and tree species. Because the potential wetland creation areas and the existing degraded wetland are near each other and are similar in composition, the concept for wetland enhancement would be closely integrated with the wetland creation. In addition, in the future, City of Kirkland may build a boardwalk throughout this mitigation area as part of their regional trails and park plan.

The grading and planting concepts proposed for the Forbes Lake West site are included in Appendix D, Sheets 2 of 12 and 4 of 12, respectively. Proposed cross sections are shown on Sheet 9 of 12.

## Hydrology Sources

Wetland hydrology in the creation area will be provided by matching the elevation of the existing adjacent wetlands and Forbes Lake. The final grades are included in Appendix D, Sheets 4 of 12 and 9 of 12.

## Expected Seasonal Water Level Fluctuations

Water levels in the wetland will be controlled by the elevation of Forbes Lake. Forbes Lake has a constrained outlet, and water levels are generally consistent between approximately 247 feet MSL and 247.5 feet MSL. The elevation of Forbes Lake at the time of the civil survey was approximately 247.3 feet MSL. Table A-1 shows the proposed bottom elevations, Cowardin classification system and predominant water regime modifier for each of the planting zones proposed for the Forbes Lake West site.

**Table A-1: Forbes Lake West Proposed Hydrologic Regimes**

Planting Zone (Per Sheet 4 of 12)	Area (Square Feet)	Bottom Elevation Ranges (See Sheet 2 of 12)	Expected Water Elevations			Cowardin Classification	
			Average	High	Low	System	Predominant Water Regime Modifier
Emergent Wetland Zone A	8,400	246 - 247	247.3	249	247	Palustrine	Permanently flooded
Emergent Wetland Zone B	6,100	246.5 - 247.3	247.3	249	247	Palustrine	Intermittently exposed
Lakeshore	702	247 - 247.3	247.3	249	247	Lacustrine	Semi permanently flooded
Emergent Wetland Edge	4,028	247 - 247.3	247.3	249	247	Palustrine	Semi permanently flooded
Scrub Shrub Wetland	9,682	247 - 248	247.3	249	247	Palustrine	Temporarily flooded (2)
Wetland Forest	41,964	247-251	247.3	249	247	Palustrine	Saturated
Upland Buffer	2,200	n/a	n/a	n/a	n/a	n/a	n/a

## Soil Preparation

Native wetland soils will be retained and re-used on site where possible. Much of the areas with nonnative soils are dominated by reed canarygrass. Native soils are primarily dominated by mowed lawn. Excavations in fill areas conducted during the wetland delineation identified that nonnative soils were in excess of 3 feet thick in places. Areas of nonnative soils within the wetland creation areas will be removed from the site. Only native soils will be retained and re-used. The mitigation plan anticipates removal of nonnative soils from the site to be disposed at an approved upland site. Given the native soil conditions observed on the site, areas with native soils are not anticipated to require substantial amendments. Where necessary, wetland soils will be created by amending loam topsoil with a minimum organic content of 30 percent using compost.

## Vegetation Community Types

Plantings in the wetland mitigation areas will be installed to establish a mix of forested, scrub-shrub, and emergent wetland communities. Plantings in upland areas will be installed to establish a forested community. These ultimate cover types will be created with a variety of native trees, shrubs, and herbaceous plants as indicated on Sheet 4 of 12 of the attached design plans. No clearing of native upland forest within existing buffer areas will be required. The upland buffer area that will be enhanced is currently closely cropped lawn. Table A-2 shows the proposed Cowardin classification system, subsystem, class, subclass, and predominant water regime modifier for each of the planting zones proposed for the Forbes Lake West site.

**Table A-2: Forbes Lake West Proposed Vegetation Community Types**

Planting Zone (Per Sheet 4 of 12)	Area (Square Feet)	Cowardin Classification				
		System	Subsystem	Class	Subclass	Predominant Water Regime Modifier
Emergent Wetland Zone A	8,400	Palustrine	n/a	Emergent	Persistent	Permanently flooded
Emergent Wetland Zone B	6,100	Palustrine	n/a	Emergent	Persistent	Intermittently exposed
Lakeshore	702	Lacustrine	Littoral	Scrub-shrub	Broad-leaved deciduous	Semi permanently flooded
Emergent Wetland Edge	4,028	Palustrine	n/a	Emergent	Persistent	Semi permanently flooded
Scrub Shrub Wetland	9,682	Palustrine	n/a	Scrub-shrub	Broad-leaved deciduous	Temporarily flooded (2)
Wetland Forest	41,964	Palustrine	n/a	Forested	Needle-leaved evergreen	Saturated
Upland Buffer	2,200	n/a	n/a	n/a	n/a	n/a

## Table of Plants for Each Community

The proposed plant schedule for the Forbes Lake West site is included on Sheet 4 of 12 of the attached design plans.

## Control of Invasive Species

Existing reed canarygrass, blackberries and their root masses that occur on the site will be excavated and removed from the wetland creation and enhancement areas. These species will also be removed by their roots, grubbing and/or hand digging as necessary, from the enhancement areas. All grubbed areas will be replanted with native vegetation. Following construction, control of invasive species during the 10-year monitoring program will be the responsibility of WSDOT. Mitigation site management activities are described in Section 6 of the Mitigation Plan.

## Goals, Objectives, and Standards of Success

The wetland impacts associated with the Kirkland Nickel Project occur within three distinct local jurisdictions. Because of the desire to account for impacts within each jurisdiction in the simplest manner, the mitigation goals are identified based on which impacts occur in each jurisdiction. This has been done to account for the need to meet local, state, and federal mitigation requirements and final negotiated replacement ratios. The following is a summary of the mitigation proposed at the Forbes Lake West mitigation site:

- Provide a minimum of 0.561 acres of Category II wetland creation at the Forbes Lake West site as mitigation for 0.312 acres of impacts to Category III wetlands located within the City of Kirkland.
- Provide a minimum of 0.051 acres of upland buffer enhancement at the Forbes Lake West site as partial mitigation for 2.014 acres of wetland buffer impacts to wetlands located within the City of Kirkland and unincorporated King County. (An additional 1.435 acres of upland buffer enhancement will occur at the Forbes Lake East site. The total upland habitat enhancement on both sites totals 1.537 acres.)
- Provide a minimum of 0.864 acres of Category II wetland enhancement at the Forbes Lake West site as mitigation for temporal losses and losses to wetland function as a result of temporary, indirect, and wetland buffer impacts from the project.

## Mitigation Goals

The mitigation goals for the Forbes Lake West site include:

- Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas;
- Establish native tree, shrub, and/or groundcover vegetation communities in the wetland buffer areas;
- Establish wetland hydrology in the wetland creation areas.
- Provide improved wildlife habitat through the installation of standing dead coniferous snags for perching and nesting opportunities for birds; and installation of large woody debris for cover opportunities for small mammals, birds, and amphibians.

## **Ultimate Category of Wetland and Number of Years to Achieve**

The Forbes Lake West mitigation site is located adjacent to Forbes Lake and its associated with a large, regionally significant wetland complex. The Forbes Lake West site includes currently degraded wetlands and adjacent disturbed upland areas within this larger complex. The Forbes Lake wetland complex within the City of Kirkland is classified as a Class 1 wetland under City of Kirkland code, and it meets the requirements for a Category II wetland under the Ecology rating system for Western Washington (Hruby, 2004). The WSDOT EPM specifies that mitigation plans should identify the ultimate category of the wetland created. This information, combined with the number of years to achieve success, is used to establish appropriate monitoring requirements. The ultimate category of wetland on the Forbes Lake West site is anticipated to be Category II. In this instance, this rating is due to the site's association with and continuity with the larger, adjacent Forbes Lake Category II wetland complex and not a result of mitigation actions. The goal of the mitigation are is to create areas of forested, scrub-shrub, and emergent wetlands in association with the larger wetland complex that support or enhance the overall functions provided by the larger system.

Because of the goal of achieving forest cover within the site, it is anticipated that it will require 10 years to determine if the proposed forested wetland vegetation has become successfully established. Monitoring timing, based on a 10-year monitoring program, is described in Section 6 of this study. The performance standards described below similarly include milestones based on the anticipated 10-year period necessary to achieve mitigation success.

### **Objective – Hydrology**

Establish wetland hydrology in a minimum of 0.561 acre.

#### **Interim Performance Measures (Monitoring Years 1-9)**

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least 2 consecutive weeks (5 percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

### **Success Standard (Year 10)**

Wetland areas will be delineated using methods described in the Washington State Wetlands Identification Manual (Ecology, 1997) to assure that the mitigation site contains at least 1.425 acre of created and enhanced wetland.

### **Objective – Wetland Vegetation**

Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas.

#### **Interim Performance Measures**

Performance Measure 1 (Year 1): Planted woody species in the wetland will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands.

Performance Measure 3 (Year 5): After five years, aerial cover of native woody species will be at least 50 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Performance Measure 4 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the emergent wetland zone by Year 5.

Performance Measure 5 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 5.

Performance Measure 6 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

## **Success Standards**

Success Standard 1 (Year 3): After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

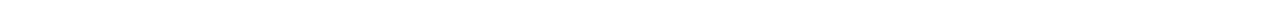
Success Standard 2 (Year 10): After 10 years, aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Success Standard 3 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 8 percent relative cover for each species in the emergent wetland zone by Year 10.

Success Standard 4 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

Success Standard 5 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

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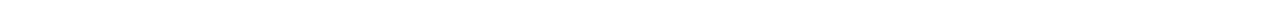


**Appendix B**  
**Forbes Lake East**  
**Description of Mitigation Sites**  
**and**  
**Mitigation Strategy**

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# **Description of Mitigation Site – Forbes Lake East**

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## **Rationale for Choice**

The Forbes Lake East site will provide mitigation in the form of wetland creation. This disturbed site is located in proximity to larger adjacent high quality wetlands and has sufficient area to create at least 1.5 acres of new wetland. The site is currently owned by the City of Kirkland, and there are plans to develop the area as a city park. In addition, the City has identified flooding problems around Forbes Lake and wetland mitigation at this location will address City concerns and needs by providing flood storage benefits.

## **Location**

The Forbes Lake East mitigation site is an approximately 2-acre property located in the City of Kirkland in Township 25 North, Range 5 East, Section 4. This site is east of Forbes Lake, West of 124th Avenue NE and north of NE 95th Street.

## **Ownership**

The Forbes Lake East site is composed of 6 adjacent lots owned by the City of Kirkland. The site is undeveloped. WSDOT will secure permission to use the site for mitigation through a Memorandum of Agreement with the City of Kirkland.

## **Land Use on and Adjacent to the Site**

The parcels that compose the Forbes Lake East site are adjacent to Forbes Lake. Two single family homes are located near the southeastern corner of the site. An undeveloped parcel occurs south of the site. Multi-family and single family development is found to the north and east of the proposed mitigation site. It appears that large amounts of nonnative fill material was placed on portions of the property before the site was owned by the City of Kirkland.

## **Ecological Setting**

Most of the Forbes Lake East site is adjacent to Forbes Lake. Wetland extends off site to the north. The site is part of a much larger wetland system associated with Forbes Lake. The site is located in the upper watershed of the Forbes Lake drainage, a tributary to Lake Washington.

## **Wetlands**

Wetlands were delineated on this site on October 13, 2004, using methodology from the *Washington State Wetlands Identification and Delineation Manual* (Washington Department of Ecology 1997) and the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987). Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the manuals were determined to be wetland.

The wetland on this site is considered a Class I wetland according to City of Kirkland regulations and a Category II wetland according to the *Washington State Wetland Rating System for Western Washington, Revised* (Hruby, 2004).

## **Existing Vegetation**

The Cowardin classification is used to classify wetlands based on plant associations and water regime (Cowardin et al., 1979). According to this system, the wetland on the Forbes Lake East

site is primarily palustrine forested (PFO) wetland. A small palustrine scrub-shrub (PSS) area is found adjacent to northern property boundary. Most of the site is currently upland and is dominated by extensive, dense Himalayan blackberry. Mature conifers grow in the extreme northeastern and extreme southeastern corners of the site. Mature deciduous trees grow along the northwestern property boundary and in the southwestern corner of the site adjacent to Forbes Lake.

## **Streams and Other Water Resources**

A small headwater tributary to Forbes Lake bisects the eastern half of the site. The intermittent stream enters the site from a culvert under NE 124th Avenue and flows through a narrow, deeply incised channel before widening and flowing north offsite. The intermittent channelized drainage parallels the northern site boundary. This drainage will be redirected through features on the mitigation site to provide a more natural stream configuration.

## **Soils**

Soil investigation found native soils with hydric indicators on a portion of the site and found large amounts of nonnative hydric soils on the disturbed portions of the site. Native soils near Forbes Lake have an A horizon that extends to 4 inches deep and is a black (10YR 2/1) peaty silty loam. The B horizon extends from 4 inches to at least 16 inches and is a very dark grayish brown (10YR 3/2) silt loam. Other wetland areas have an A horizon extending to 8 inches that is a very dark brown (10YR 2/2) clay loam. The B horizon extends to at least 16 inches and is a dark greenish gray (4/10Y) sandy clay loam with dark yellowish brown (10YR 4/4) mottles. Nonnative soils were found mostly in the eastern portion of the site. These soils have an A horizon that extends to 5 inches and is a very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 5 inches to at least 16 inches and is an olive brown (2.5Y 4/3) sandy clay loam with dark yellowish brown (10YR 4/4) mottles. Gravels and cobbles can be found throughout a jumbled profile, indicating nonnative fill. Soils across the site were moist during the time of field visit due to the late summer dry conditions.

## **Existing Wildlife or Domestic Animals**

No domestic animals are present on the site. No specific priority species or habitats are listed on the site (Washington State Department of Natural Resources, 2004). Resident cutthroat have been identified in Forbes Lake drainage and are listed as Priority Resident Fish (Washington State Department of Natural Resources, 2004). Incidental observations of wildlife at the Forbes Lake East mitigation site during the wetland delineation and design phases have included song birds, rodents (rats), bull frogs, and waterfowl on Forbes Lake.

## **Mitigation Strategy – Forbes Lake East**

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### **Landscape/Watershed Position of Proposed Site**

The Forbes Lake East site is adjacent to Forbes Lake. Forbes Lake is the headwaters for Forbes Creek, a direct tributary to Lake Washington.

### **General Description of Mitigation**

The one primary wetland creation area (totaling 1.559 acres) will be created by excavating most of the central portion of the site down to the elevation of the adjacent lake and wetlands. Extensive excavation will be necessary to remove the nonnative fill and native upland soils that

are present throughout most of the central portion of the site. Excavation will range from one to 16 feet in depth. It will be necessary to establish upland buffer vegetation adjacent to the created wetland areas (except for along the north and west of the site where existing wetlands extend off site). Buffer areas will be graded to slopes no more than 3:1 and will be replanted with native upland vegetation.

The large quantity of degraded upland habitat dominated by blackberry provides a good opportunity to increase functions and values on the site by planting native shrub and tree species throughout the wetland and upland buffer areas. In addition, in the future, the City of Kirkland may build a parking area and a trail and boardwalk through this mitigation area as part of their regional trails and park plan. The area that would be covered by a trail or boardwalk has been subtracted from the total area of wetland enhancement credited at the Forbes Lake West site.

The grading and planting concepts proposed for the Forbes Lake East site are included in Appendix D, Sheets 6 of 12 and 8 of 12, respectively. Proposed cross sections are shown on Sheet 9 of 12.

## Hydrology Sources

Wetland hydrology in the creation area will be provided by matching the elevation of the existing adjacent wetlands and Forbes Lake. The final grades are included in Appendix D, Sheets 6 of 12 and 9 of 12.

## Expected Seasonal Water Level Fluctuations

Water levels in the wetland will be controlled by the elevation of Forbes Lake and inflow from the on-site stream. Forbes Lake has a constrained outlet and water levels are generally consistent between approximately 247 feet MSL and 247.5 feet MSL. The elevation of Forbes Lake at the time of the civil survey was approximately 247.3 feet MSL. Table B-1 shows the proposed bottom elevations, Cowardin classification system and predominant water regime modifier for each of the planting zones proposed for the Forbes Lake East site.

**Table B-1: Forbes Lake East Proposed Hydrologic Regimes**

Planting Zone (Per Sheet 8 of 12)	Area (Square Feet)	Bottom Elevation Ranges (See Sheet 2 of 12)	Expected Water Elevations			Cowardin Classification	
			Average	High	Low	System	Predominant Water Regime Modifier
Emergent Wetland Zone A	24,063	246 - 247	247.3	249	247	Palustrine	Permanently flooded
Lakeshore	3,588	247 - 247.3	247.3	249	247	Lacustrine	Semi permanently flooded
Emergent Wetland Edge	6,590	247 - 247.3	247.3	249	247	Palustrine	Semi permanently flooded
Scrub Shrub Wetland	40,516	247.3 - 248	247.3	249	247	Palustrine	Temporarily flooded
Wetland Forest	20,737	247.3 - 248	247.3	249	247	Palustrine	Temporarily flooded
Upland Buffer	62,506	n/a	n/a	n/a	n/a	n/a	n/a

## Soil Preparation

It is expected that between the excavation necessary to create wetland area on-site and the work necessary to successfully remove Himalayan blackberry from the site, little native soil will remain within the mitigation areas following initial earthwork. It is expected that topsoil and organic compost will be required to be imported and applied throughout the site. At least one foot of loam topsoil will be placed throughout the upland buffer areas. At least one foot of loam topsoil with a minimum organic content of 30 percent using compost will be placed throughout the wetland creation areas. Prior to the installation of topsoil, sub grade soil will be scarified to facilitate transfer of water and the growth of plant roots from into the subsoil.

## Vegetation

### Community Types

Revegetation in the wetland mitigation areas will be a mix of forested, scrub-shrub, and emergent wetland communities. These will be created with a variety of native trees, shrubs, and herbaceous plants. A buffer of at least a 100-foot wide on average, will be established around the wetland creation areas (except where existing buffer extends off site). Upland buffer areas will be replanted with trees and shrubs with the intention of establishing a forested buffer community. Table B-2 shows the proposed Cowardin classification system, subsystem, class, subclass, and predominant water regime modifier for each of the planting zones proposed for the Forbes Lake East site.

**Table B-2: Forbes Lake East Proposed Vegetation Community Types**

Planting Zone (Per Sheet 8 of 12)	Area (Square Feet)	Cowardin Classification				
		System	Subsystem	Class	Subclass	Predominant Water Regime Modifier
Emergent Wetland Zone A	24,063	Palustrine	n/a	Emergent	Persistent	Permanently flooded
Lakeshore	3,588	Lacustrine	Littoral	Scrub-shrub	Broad-leaved deciduous	Semi permanently flooded
Emergent Wetland Edge	6,590	Palustrine	n/a	Emergent	Persistent	Semi permanently flooded
Scrub Shrub Wetland	40,516	Palustrine	n/a	Scrub-shrub	Broad-leaved deciduous	Temporarily flooded
Wetland Forest	20,737	Palustrine	n/a	Forested	Needle-leaved evergreen	Temporarily flooded (2)
Upland Buffer	62,506	n/a	n/a	n/a	n/a	n/a

## Table of Plants for Each Community

The proposed plant schedule for the Forbes Lake East site is included in Appendix D, Sheet 8 of 12.

## Control of Invasive Species

Blackberry and reed canarygrass should be effectively removed from most of the site by the extensive excavation that will be necessary to construct the wetland areas. However, along the margins of the site that will not be excavated there are several areas of blackberry. English Ivy and Periwinkle (vinca) were also observed in some areas of the site. Blackberry and other non-native invasive species will also be removed from ungraded areas by grubbing and/or hand digging as necessary to move as much root mass as possible. Given the extent of Himalayan blackberry growth on the site and the presence of blackberry and ivy on adjacent properties, active control of invasive species will be necessary on the site throughout the monitoring period until the native plantings can achieve full ground coverage. Following construction, control of invasive species during the 10-year monitoring program will be the responsibility of WSDOT. Mitigation site management activities are described in Section 6 of the Mitigation Plan.

## Goals, Objectives, and Standards of Success

The wetland impacts associated with the Kirkland Nickel Project occur within three distinct local jurisdictions. Because of the desire to account for impacts within each jurisdiction in the simplest manner, the mitigation goals are identified based on which impacts occur in each jurisdiction. This has been done to account for the need to meet local, state, and federal mitigation requirements and final negotiated replacement ratios. The following is a summary of the mitigation proposed at the Forbes Lake East mitigation site:

- Provide a minimum of 1.202 acres of Category II wetland creation at the Forbes Lake East site as mitigation for 0.925 acres of impacts to Category IV wetlands located within the City of Kirkland.
- Provide a minimum of 0.305 acres of Category II wetland creation at the Forbes Lake East site as mitigation for 0.235 acres of impacts to Category IV wetlands located within unincorporated King County.
- Provide a minimum of 0.109 acres of Category II wetland creation at the Forbes Lake East as partial mitigation for 0.136 acres of impacts to Category III wetlands located within the City of Bothell. (An additional 0.136 acres will be provided at the Thrasher's Corner site. The total wetland creation area at both sites totals 0.254 acre.)
- Provide a minimum of 1.486 acres of upland buffer enhancement at the Forbes Lake East site as partial mitigation for 2.014 acres of wetland buffer impacts to wetlands located within the City of Kirkland and unincorporated King County. (An additional 0.051 acres of upland buffer enhancement will occur at the Forbes Lake West site. The total upland habitat enhancement on both sites totals 1.537 acres.)
- Provide a minimum of 0.572 acres of Category II wetland enhancement at the Forbes Lake East site as mitigation for temporal losses and losses to wetland function as a result of temporary, indirect, and wetland buffer impacts from the project.

## Mitigation Goals

The mitigation goals for the Forbes Lake East site include:

- Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas;
- Establish native tree, shrub, and/or groundcover vegetation communities in the wetland buffer areas;
- Establish wetland hydrology in the wetland creation areas.
- Provide improved wildlife habitat through the installation of standing dead coniferous snags for perching and nesting opportunities for birds; and installation of large woody debris for cover opportunities for small mammals, birds, and amphibians.

## **Ultimate Category of Wetland and Number of Years to Achieve**

The Forbes Lake East mitigation site is located adjacent to Forbes Lake and its associated large, regionally significant wetland complex. The Forbes Lake East site includes wetlands and disturbed upland areas adjacent to, and including, this larger complex. The Forbes Lake wetland complex within the City of Kirkland is classified as a Class 1 wetland under City of Kirkland code and it meets the requirements for a Category II wetland under the Ecology rating system for Western Washington. The WSDOT EPM specifies that mitigation plans should identify the ultimate category of the wetland created. This information, combined with the number of years to achieve success, is used to establish appropriate monitoring requirements. The ultimate category of wetland on the Forbes Lake East site is anticipated to be Category II. In this instance, this rating is due to the site's association with and continuity with the larger, adjacent Forbes Lake Category II wetland complex and not a result of mitigation actions. The goal of the mitigation are is to create areas of forested, scrub-shrub, and emergent wetlands in association with the larger wetland complex that support or enhance the overall functions provided by the larger system.

It is anticipated that it will require 10 years to determine if the proposed forested wetland vegetation has become successfully established. Monitoring timing based on a 10-year monitoring program is described in Section 6 of this study. The performance standards described below similarly include milestones based on the anticipated 10-year period necessary to achieve mitigation success.

### **Objective – Hydrology**

Establish wetland hydrology in a minimum of 1.616 acre.

#### **Interim Performance Measures (Monitoring Years 1-9)**

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least 2 consecutive weeks (5 percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

#### **Success Standard (Year 10)**

Wetland areas will be delineated using methods described in the Washington State Wetlands Identification Manual (Ecology, 1997) to assure that the mitigation site contains at least 2.188 acre of created and enhanced wetland.

## **Objective – Wetland Vegetation**

Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas.

### **Interim Performance Measures**

Performance Measure 1 (Year 1): Planted woody species in the wetland will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands.

Performance Measure 3 (Year 5): After five years, aerial cover of native woody species will be at least 50 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Performance Measure 4 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the emergent wetland zone by Year 5.

Performance Measure 5 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 5.

Performance Measure 6 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

### **Success Standards**

Success Standard 1 (Year 3): After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

Success Standard 2 (Year 10): After 10 years, aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

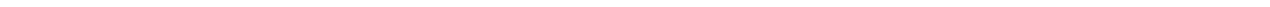
Success Standard 3 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 8 percent relative cover for each species in the emergent wetland zone by Year 10.

Success Standard 4 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

Success Standard 5 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.



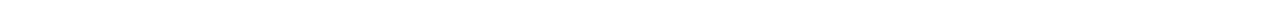
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**Appendix C**  
**Thrasher's Corner**  
**Description of Mitigation Sites**  
**and**  
**Mitigation Strategy**

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# **Description of Mitigation Site – Thrasher’s Corner**

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## **Rationale for Choice**

This site will provide mitigation in the form of wetland creation, wetland enhancement, and wetland preservation. This disturbed site is located in proximity to larger adjacent high quality wetlands.

## **Location**

The Thrasher’s Corner mitigation site is a 4.7-acre property located in the City of Bothell in Township 27 North, Range 5 East, Section 30. Also known as the Kern’s property, this parcel is west of the Bothell Everett Highway (SR-527) between 214th Street SE, which forms its southern property boundary, and Thrasher’s Corner Regional Park to the north.

## **Ownership**

This property has been acquired by WSDOT.

## **Land Use on and Adjacent to the Site**

The Thrasher’s Corner site was historically used as a home site. On this site there is an old roadbed extending through the center of the property from 214th Street SE, scattered old buildings (including a collapsed barn, a shed, an outhouse, and remains of a concrete house foundation), and an old car. This site is no longer used as a residence, and most of the site has become overgrown.

There are other private residential and vacant properties to the west, south, and east. Thrasher’s Corner Regional Park is to the north.

## **Ecological Setting**

Most of the Thrasher’s Corner site is wetland and extends off site to the west, north, and east. It is part of a much larger wetland system associated with North Creek.

## **Wetlands**

Wetlands were delineated on this site on August 31, 2004, using methodology from the *Washington State Wetlands Identification and Delineation Manual* (Washington Department of Ecology 1997) and the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987). Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the manuals were determined to be wetland.

The wetland on this site is considered a Class 1 wetland according to City of Bothell regulations and a Category II wetland according to the *Washington State Wetland Rating System for Western Washington, Revised* (Hruby, 2004).

## **Existing Vegetation**

The Cowardin classification is used to classify wetlands based on plant associations and water regime (Cowardin et al., 1979). According to this system, the wetland on the Thrasher’s Corner Site is a mix of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) wetland types. Reed canarygrass, creeping buttercup, lady fern, small-flowered bulrush, skunk cabbage, and cattail dominate the PEM areas. Willow, spirea, salmonberry,

evergreen and Himalayan blackberries dominate the PSS areas. Red alder, black cottonwood, bitter cherry, willow, and Sitka spruce dominate the PFO areas. Because the wetland extends off the property in all directions, there is little wetland buffer on-site.

## **Streams and Other Water Resources**

This wetland is associated with Crystal Creek, a tributary to North Creek. Crystal Creek enters the site from the west, flows through the wetland in the southern third of the property, flows through a culvert under the old roadbed, and exits near the center of the east property boundary. There is a ditch along the western side of the road south of Crystal Creek. Another swale extends from between the north end of the old road and the fallen barn east towards the property boundary and Crystal Creek.

## **Soils**

Soils observed within the wetland areas were predominately black (10YR 2/1) and very dark gray (10YR 3/1) organic muck and silty loam. This is consistent with the *Soil Survey of Snohomish County Area* (USDA Soil Conservation Service, 1983), which indicates the presence of Mukilteo muck in this vicinity. Mukilteo muck is a very deep, poorly drained soil found in depressional areas. It is formed in organic material derived predominantly from sedges.

Soils outside the wetland boundaries were unmottled very dark brown (10YR 2/2) and dark brown (10YR 3/3) sandy and silty loams. The only upland areas (i.e., not jurisdictional wetland) on the property are the old roadbed and a very small area in the northeast corner of the property along a ditch next to the powerline corridor. Hydrology at the time of delineation (August 2004) ranged from inundated, saturated, and damp within the wetland boundaries, and damp or dry in the upland areas.

Four soil logs (SL) were dug on the site in October 2004 to examine and record existing soil characteristics. Two of these were in the existing wetland (SL#1 and SL#2) and two were in the proposed creation area of the old roadbed (SL#3 and SL#4). The locations of the soil logs are shown on Sheet 1 of 6 Existing Conditions Plan. Data from these pits confirms that there is native wetland soil underneath the old roadbed, which will be exposed as a result of wetland creation. The road fill was observed to be approximately 36 inches deep near the south end and approximately 14 inches deep near the north end.

## **Existing Wildlife or Domestic Animals**

The site was historically used as a farm; however, this property has been abandoned for several years. No domestic animals are present on the site. Fall Chinook, coho salmon, sockeye salmon, and resident cutthroat have been identified in North Creek and are listed as priority anadromous and resident fish. Incidental observations of wildlife at the Thrasher's Corner mitigation site during the wetland delineation and design phases have included song birds and presumed cutthroat trout in Crystal Creek.

# Mitigation Strategy – Thrasher’s Corner

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## Landscape/Watershed Position of Proposed Site

The Thrasher’s Corner site and the adjacent Thrasher’s Regional Park are part of the North Creek Basin, which is considered part of the Lower Sammamish River Drainage. Crystal Creek, which flows across the mitigation site, is a tributary to North Creek.

## General Description of Mitigation

The proposed mitigation is designed to achieve no net loss of wetland acreage in the City of Bothell, in combination with wetland creation, enhancement, and preservation. The proposed mitigation plan addresses the specific loss of wetland functions at the impact site and replaces these functions at a site that will provide better habitat and will help establish sustainable habitat within a regional context. The habitat values in the region will increase due to this proposal.

The wetland creation portion of the plan includes removal of the old roadbed to meet the mitigation objectives of the Kirkland Nickel Project, as described below. In order to achieve 1:1 wetland creation (i.e. no net loss), 0.136 acres of wetland will be created. There is approximately 0.210 acre of road fill that is available for wetland creation on the Thrasher’s Corner site. To enhance the overall functionality of the mitigation site, WSDOT proposes to create an additional 0.074 acre of wetland at this time and allocate this area as partial compensation for anticipated wetland impacts for the 124<sup>th</sup> to SR 522 Northbound Lane Braid project that is currently in planning. As a result, the total wetland creation proposed for the Thrasher’s corner site will be 0.210 acre.

To create 0.210 acre of new wetland, the old road fill will be excavated to expose native soils and reconnect wetland hydrology. Revegetation will be achieved with a mix of native trees, shrubs, and herbaceous plants. The Crystal Creek culvert also will be removed and stream banks revegetated.

The wetland creation portion of the plan focuses on the areas of the site that have been disturbed by previous human activities such as clearing and building. While these areas are still jurisdictional wetland, there is opportunity to enhance and improve upon environmental processes. Several small, irregularly shaped depressions will be excavated to remove non-native plants and increase wetland diversity, edges, and habitat for amphibians and other wildlife. Reed canarygrass and blackberry thickets will be replaced with a variety of native trees, shrubs, and emergent wetland plants. Standing snags and large woody debris will also be installed to increase habitat values associated with forested wetland habitats. Old structures, including buildings, car, culverts, and concrete foundation, will be removed and the disturbed areas revegetated.

The wetland enhancement portion of the plan also provides for installation of additional native trees and shrubs within existing, relatively undisturbed portions of the wetland to increase species and/or structural diversity within the plant community. Blackberries will be removed as needed prior to installation of enhancement plantings. Existing high quality wetland also will be preserved as part of this mitigation plan. The grading and planting concepts proposed for the Thrasher’s Corner site are included in Appendix D, Sheets 4 of 6 and 5 of 6, respectively. Proposed cross sections are shown on Sheet 6 of 6.

## Hydrology Sources

Matching the elevation of the existing adjacent wetlands and reconnecting the wetland areas currently separated by the old roadbed will provide wetland hydrology in the creation area. It is expected that the new wetland area will be seasonally saturated.

As stated above, several small depressions will be excavated in the wetland creation area to increase the habitat value of the wetland and to remove invasive plant species. These depressions will provide increased diversity of hydrologic conditions within the wetland.

## Expected Seasonal Water Level Fluctuations.

Five piezometers were installed at the Thrasher's Corner site in October 2004 to monitor existing water levels. The locations are shown in Appendix D, Sheet 1 of 6 Existing Conditions Plan. Figure C-1 shows the water levels measured during the past three months. Also shown is the rainfall for the day before each reading, which demonstrates that the water levels on this site tend to fluctuate fairly closely with recent rainfall. These piezometers will continue to be monitored throughout the permitting phase to confirm that adequate hydrology will be present to support the proposed plan.

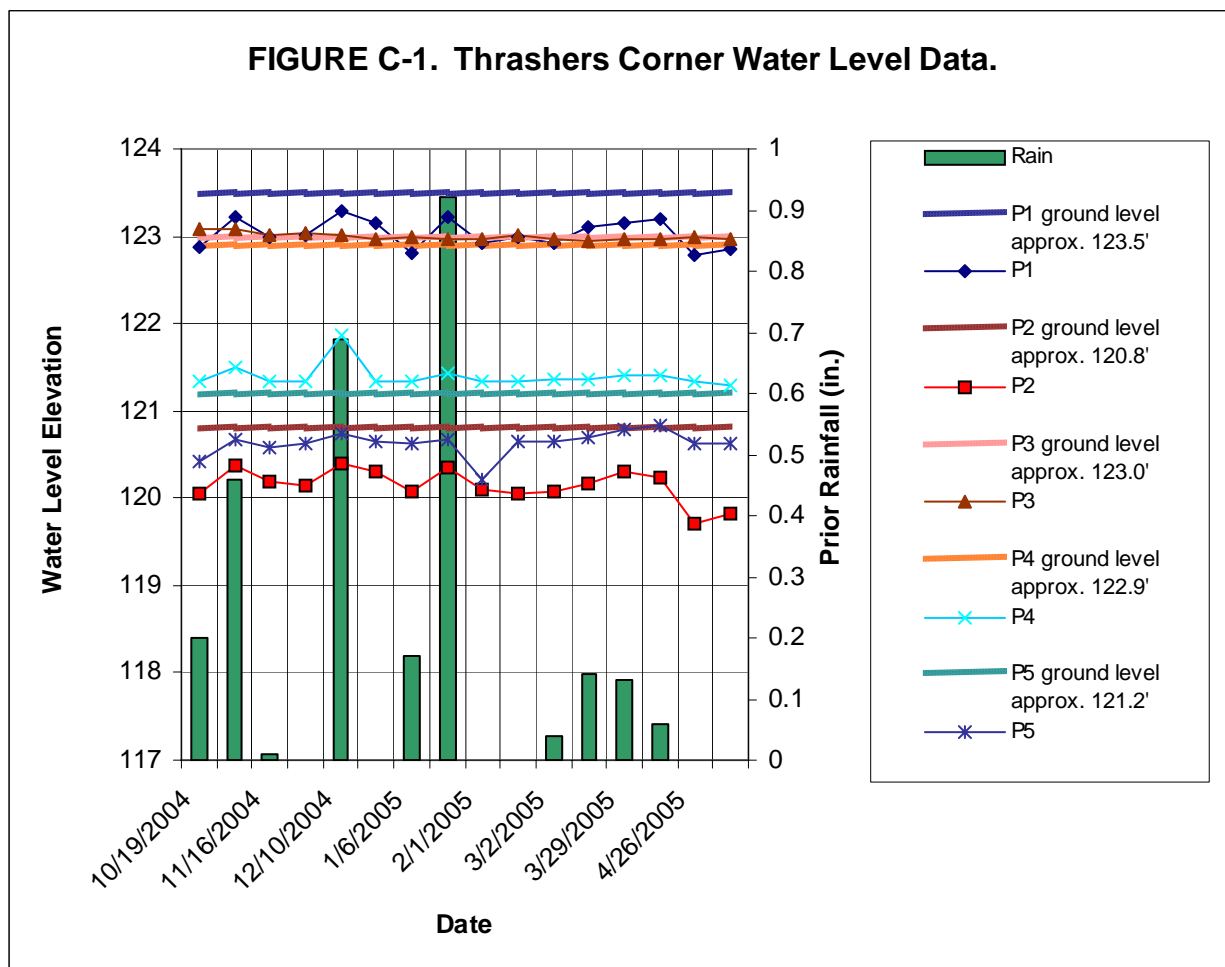


Table C-1 shows the proposed bottom elevations, Cowardin classification system and predominant water regime modifier for each of the planting zones proposed for the Thrasher's Corner site.

**Table C-1: Thrasher's Corner Site Proposed Hydrologic Regimes**

Planting Zone (Per Sheet 5 of 6)	Bottom Elevation Ranges (See Sheet 4 of 6)	Expected Water Elevations			Cowardin Classification	
		Average	High	Low	System	Predominant Water Regime Modifier
Emergent Wetland	118-122	121.5	122.5	121	Palustrine	Semipermanently inundated
Wetland Forest (North of northernmost ditch)	120-124	122.5	123.5	122	Palustrine	Seasonally inundated
Wetland Forest (west of existing roadbed)	122-124	122	123.1	121.3	Palustrine	Saturated
Wetland Forest (east of existing roadbed)	119-122	120.5	120.9	119.7	Palustrine	Saturated

## Soil Preparation

Any areas of compacted soil will be loosened with a shovel, pick, or rock bar prior to planting. Created wetland area soil will be amended to a minimum organic content of 30 percent using vegetable compost, as needed to be verified during installation. Planting details are included in Appendix D, Sheet 5 of 6. The soil logs described above indicate that no other soil amendments will be necessary.

## Vegetation

### Community Types

Revegetation in the wetland mitigation areas will be a mix of forested, scrub-shrub, and emergent wetland communities. These will be created with a variety of native trees, shrubs, and herbaceous plants. Since the existing wetland extends off the property in all directions, the plan does not include wetland buffer revegetation. Table C-2 shows the proposed Cowardin classification system, subsystem, class, subclass, and predominant water regime modifier for each of the planting zones proposed for the Thrasher's Corner Site.



**Table C-2: Thrasher's Corner Site Proposed Vegetation Community Types**

Planting Zone (Per Sheet 5 of 6)	Cowardin Classification				
	System	Subsystem	Class	Subclass	Predominant Water Regime Modifier
Emergent Wetland	Palustrine	n/a	Emergent	Persistent	Semipermanently inundated
Wetland Forest (North of northernmost ditch)	Palustrine	n/a	Forested	Needle-leaved evergreen	Seasonally inundated
Wetland Forest (west of existing roadbed)	Palustrine	n/a	Forested	Needle-leaved evergreen	Saturated
Wetland Forest (east of existing roadbed)	Palustrine	n/a	Forested	Needle-leaved evergreen	Saturated

## Table of Plants for Each Community

The proposed plant schedule for the Thrasher's Corner site is included in Appendix C, Sheet 5 of 6.

## Control of Invasive Species

Existing reed canarygrass and blackberries will be excavated and removed from the creation and enhancement areas. These species will also be removed by their roots, grubbing and/or hand digging as necessary, from the enhancement areas. Incidental disturbance to surrounding native plant species will be minimized. Following construction, control of invasive species during the 10-year monitoring program will be the responsibility of WSDOT. Mitigation site management activities are described in Section 6 of the Mitigation Plan.

## Goals, Objectives, and Standards of Success

The wetland impacts associated with the Kirkland Nickel Project occur within three distinct local jurisdictions. Because of the desire to account for impacts within each jurisdiction in the simplest manner, the mitigation goals are identified based on which impacts occur in each jurisdiction. This has been done to account for the need to meet local, state, and federal mitigation requirements and final negotiated replacement ratios. The following is a summary of the mitigation proposed at the Thrasher's Corner mitigation site:

- Provide a minimum of 0.136 acre of Category II wetland creation at the Thrasher's Corner Site as partial mitigation for 0.136 acres of impacts to Category III wetlands located within the City of Bothell. (An additional 0.109 acre will be provided at the Forbes Lake West site. The total wetland creation area at both sites totals 0.254 acre.
- Provide a minimum of 0.074 acre of Category II wetland creation at the Thrasher's Corner Site as partial mitigation for impacts associated with the 124<sup>th</sup> to SR 522 Northbound Braid project (in progress).

- Provide a minimum of 0.717 acres of Category II wetland enhancement at the Thrasher's Corner Site as mitigation for 0.717 acres of wetland buffer impacts to wetlands located within the City of Bothell.

## **Mitigation Goals**

The mitigation goals for the Thrasher's Corner site include:

- Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas;
- Establish native tree, shrub, and/or groundcover vegetation communities in the wetland buffer areas;
- Establish wetland hydrology in the wetland creation areas.
- Provide improved wildlife habitat through the installation of standing dead coniferous snags for perching and nesting opportunities for birds; and installation of large woody debris for cover opportunities for small mammals, birds, and amphibians.

## **Ultimate Category of Wetland and Number of Years to Achieve**

The Thrasher's Corner mitigation site is located adjacent to, and includes portions of, a large wetland complex located north of State Route 527 in the City of Bothell. This wetland is categorized as a Class 1 wetland under City of Bothell code and meets the requirements for a Category II wetland under the Ecology rating system.

The general concept is to create new wetland and enhance existing degraded wetland so that the resulting area would be forested wetland with scrub-shrub and emergent subcategories. It will require 10 years to determine if the proposed forested wetland vegetation has become successfully established. Monitoring timing based on a 10-year monitoring program is described in Section 6 of this study. The performance standards described below similarly include milestones based on the anticipated 10-year period necessary to achieve mitigation success.

### **Objective – Hydrology**

Establish wetland hydrology in a minimum of 0.210 acre.

#### **Interim Performance Measures (Monitoring Years 1-9)**

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least 2 consecutive weeks (5 percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

### **Success Standard (Year 10)**

Wetland areas will be delineated using methods described in the Washington State Wetlands Identification Manual (Ecology, 1997) to assure that the mitigation site contains at least 0.927acre of created and enhanced wetland (this includes 0.074 acre of creation to be allocated to a future WSDOT project).

### **Objective – Wetland Vegetation**

Establish native tree, shrub, and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas.

### **Interim Performance Measures**

Performance Measure 1 (Year 1): Planted woody species in the wetland will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands.

Performance Measure 3 (Year 5): After five years, aerial cover of native woody species will be at least 50 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Performance Measure 4 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the emergent wetland zone by Year 5.

Performance Measure 5 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 5.

Performance Measure 6 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

### **Success Standards**

Success Standard 1 (Year 3): After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

Success Standard 2 (Year 10): After 10 years, aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

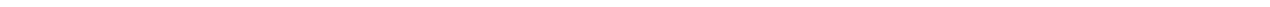
Success Standard 3 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 8 percent relative cover for each species in the emergent wetland zone by Year 10.

Success Standard 4 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

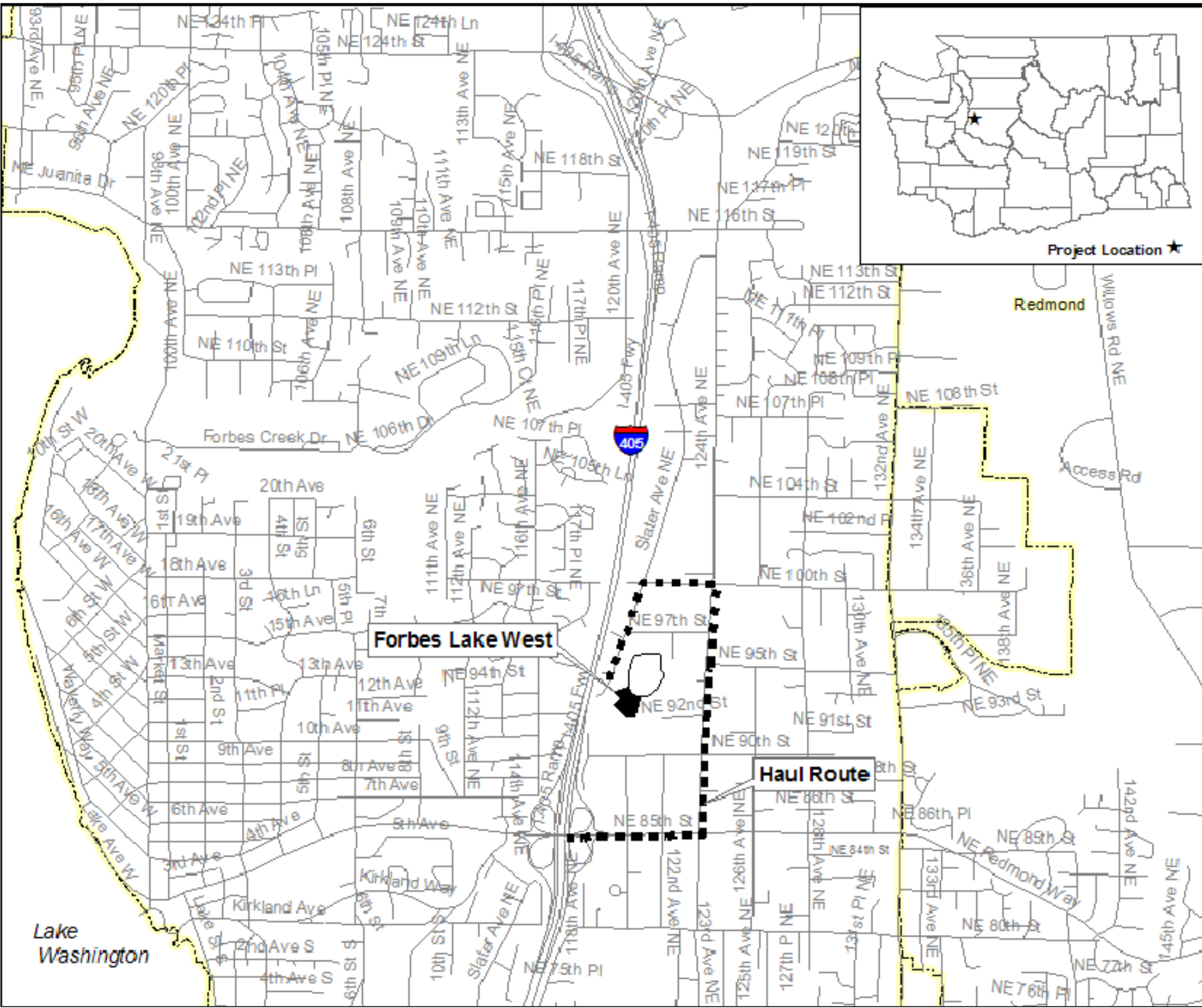
Success Standard 5 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

**Appendix D**  
**Wetland Mitigation Construction Documents**

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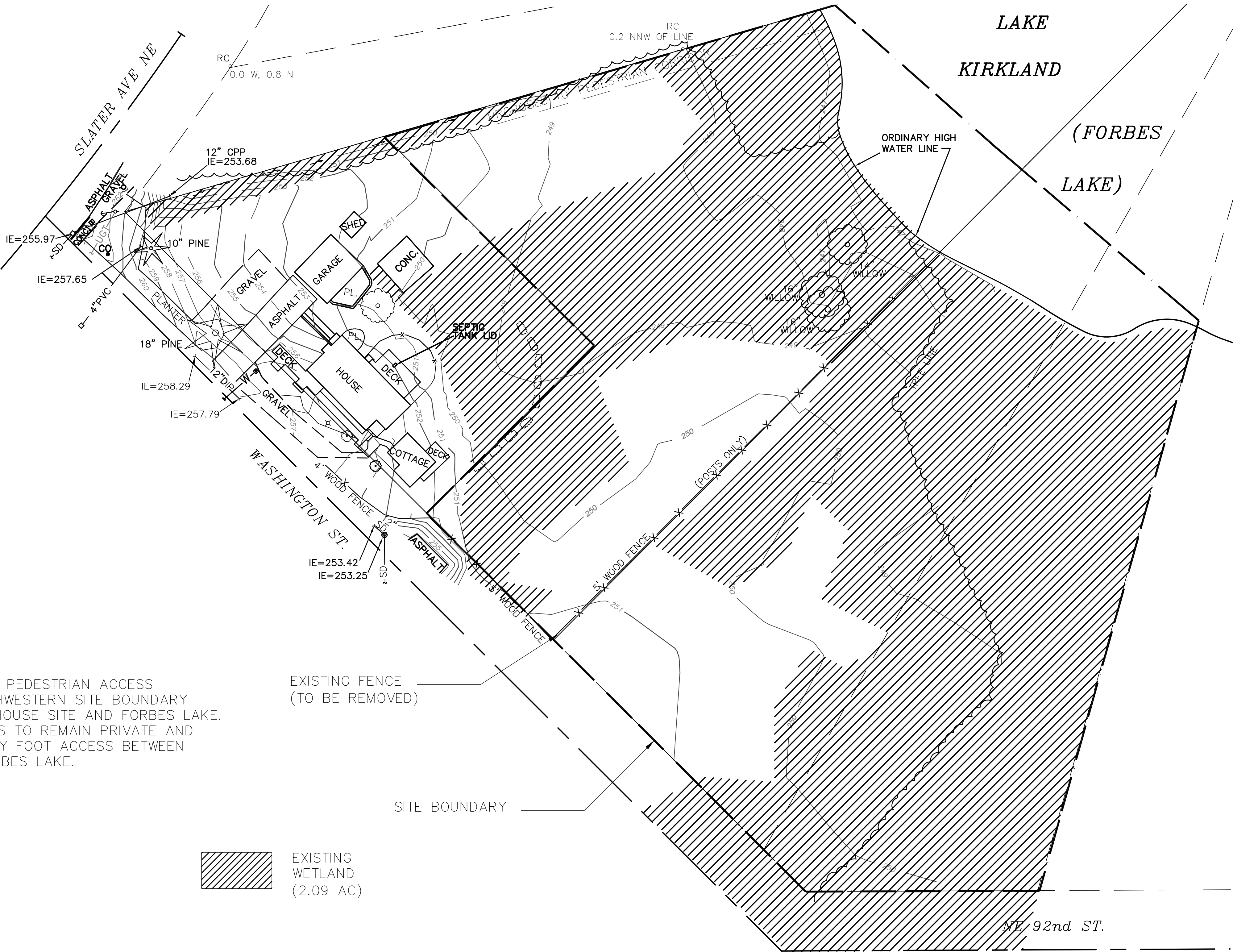




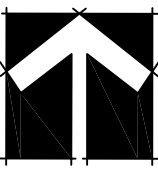
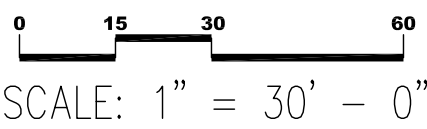
FORBES LAKE WEST – CONTEXT MAP

NTS

NOTE:  
PROVIDE A 10’ WIDE PEDESTRIAN ACCESS CORRIDOR AT NORTHWESTERN SITE BOUNDARY BETWEEN EXISTING HOUSE SITE AND FORBES LAKE. ACCESS CORRIDOR IS TO REMAIN PRIVATE AND SHALL PROVIDE ONLY FOOT ACCESS BETWEEN HOME SITE AND FORBES LAKE.



EXISTING WETLAND (2.09 AC)

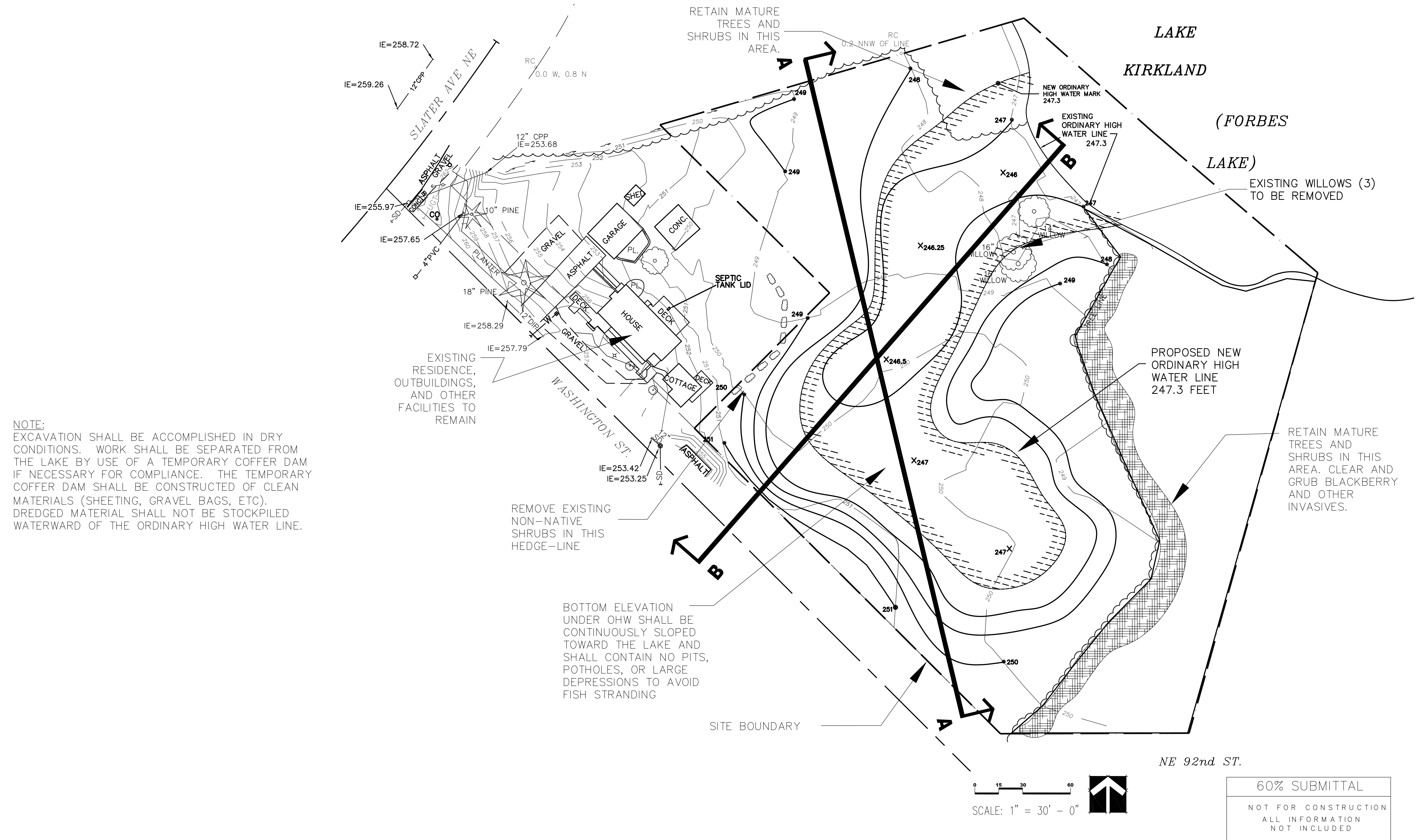


60% SUBMITTAL  
NOT FOR CONSTRUCTION  
ALL INFORMATION NOT INCLUDED

FILE NAME				REGION NO.	STATE	FED.AID PROJ.NO.						
TIME												
DATE 2/10/05	BASED ON WSDOT 2-11-05 COMMENTS	2/16/05	me	10	WASH							
PLOTTED BY	GENERAL REVISIONS	4/20/05	me									
DESIGNED BY m. epstein	PER REVIEW COMMENTS 4-27-05	5/2/05	me									
ENTERED BY	PER HPA REVIEW COMMENTS 5-5-05	5/18/05	me	JOB NUMBER								
CHECKED BY				CONTRACT NO.		LOCATION NO.						
PROJ. ENGR.												
REGIONAL ADM.	REVISION	DATE	BY									

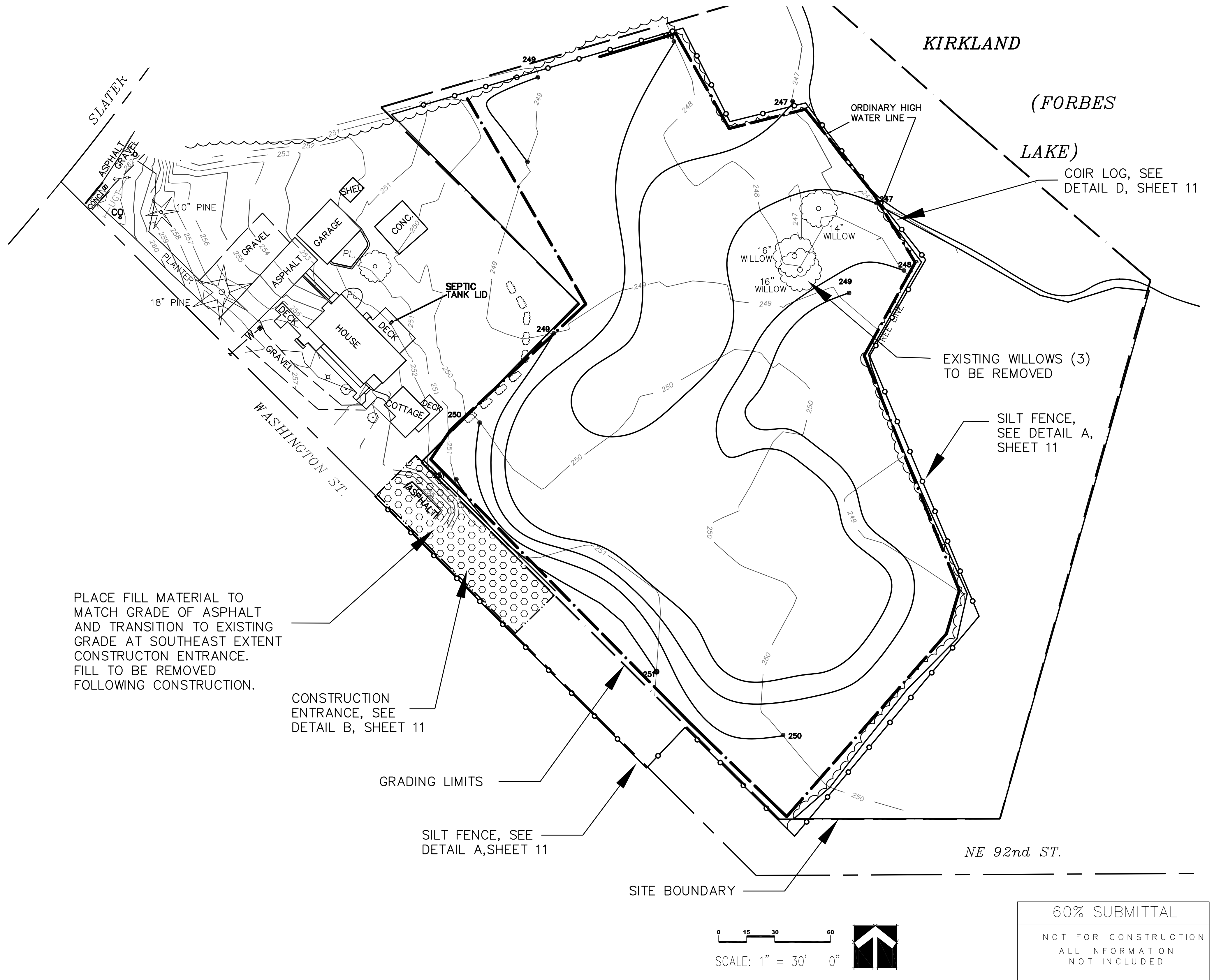




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FILE NAME				REGION NO.		STATE	FED.AID PROJ.NO.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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SCIENTIFIC NAME	COMMON NAME	QTY	SIZE	SPACING/NOTES
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### HABITAT LEGEND

PLANT ONLY TREES AND SEED  
MIX IN 10' PED ACCESS AREA

PLANT WITH ZONE C SEED MIX

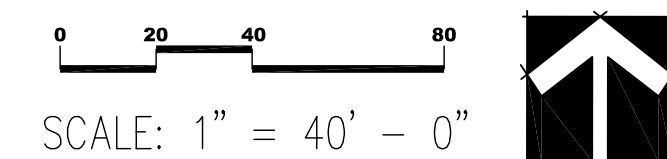
PLANTING ZONE	AREA (SF)	BOTTOM ELEVATION RANGES	AVERAGE WATER	EXPECTED HIGH WATER	EXPECTED LOW WATER
EMERGENT WETLAND ZONE A	8,400	246-247	247.3	249	247
EMERGENT WETLAND ZONE B	6,100	246.5-247.3	247.3	249	247
LAKESHORE	702	247-247.3	247.3	249	247
EMERGENT WETLAND EDGE	4,028	247-247.3	247.3	249	247
SCRUB SHRUB WETLAND	9,682	247-248	247.3	249	247
WETLAND FOREST	41,964	247-251	247.3	249	247
UPLAND BUFFER	2,200	N/A	N/A	N/A	N/A

NOT FOR CONSTRUCTION  
ALL INFORMATION  
NOT INCLUDED



SHEET  
4  
OF  
12  
SHEETS







NOT FOR CONSTRUCTION  
ALL INFORMATION  
NOT INCLUDED

FILE NAME				REGION NO.		STATE		FED.AID PROJ.NO.						I-405, SR 520 TO SR 522 KIRKLAND NICKEL PROJECT		SHEET 5 OF 12 SHEETS	
TIME				10		WASH											
DATE 2/10/05				2/16/05		me		JOB NUMBER		LOCATION NO.		DATE _____ P.E. STAMP BOX		DATE _____ P.E. STAMP BOX		FORBES LAKE EAST - EXISTING CONDITIONS	
BASED ON WSDOT 2-11-05 COMMENTS				4/20/05		me											
PLOTTED BY				5/2/05		me		CONTRACT NO.									
DESIGNED BY m. epstein				PER REVIEW COMMENTS 4-27-05													
ENTERED BY																	
CHECKED BY																	
PROJ. ENGR.																	
REGIONAL ADM.				REVISION		DATE		BY									





BOTTOM ELEVATION UNDER  
OHW SHALL BE  
CONTINUOUSLY SLOPED  
TOWARD THE LAKE TO AVOID  
FISH STRANDING

REMOVE CULVERT  
SEE DETAIL E  
SHEET 10

REALIGNED  
STREAM CENTER  
LINE

PROPOSED NEW  
ORDINARY HIGH  
WATER LINE  
247.3 FEET

FORBES  
LAKE

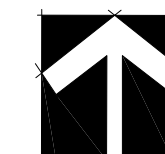
LAKE

NEW ORDINARY HIGH WATER MARK  
247.3

EXISTING WIRE FENCE  
TO BE REMOVED


N.E. 94TH PLACE  
(WASHINGTON AVENUE)

0      20      40      80  
SCALE: 1" = 40' - 0"



60% SUBMITTAL

NOT FOR CONSTRUCTION  
ALL INFORMATION  
NOT INCLUDED

FILE NAME				REGION NO.		STATE		FED.AID PROJ.NO.		<div><div>DATE</div><div>P.E. STAMP BOX</div></div>		<div><div>DATE</div><div>P.E. STAMP BOX</div></div>		<div><div><div>INTERSTATE</div><div>405</div></div><div>Project Team</div><div> Washington State Department of Transportation</div></div>		I-405, SR 520 TO SR 522 KIRKLAND NICKEL PROJECT		SHEET 6 OF 12 SHEETS	
TIME																			
DATE 2/10/05		BASED ON WSDOT 2-11-05 COMMENTS		2/16/05		me		10		WASH									
PLOTTED BY		GENERAL REVISIONS		4/20/05		me		JOB NUMBER											
DESIGNED BY m. epstein		PER REVIEW COMMENTS 4-27-05		5/2/05		me													
ENTERED BY								CONTRACT NO.		LOCATION NO.									
CHECKED BY																			
PROJ. ENGR.																			
REGIONAL ADM.		REVISION		DATE		BY													

















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ALL INFORMATION  
NOT INCLUDED

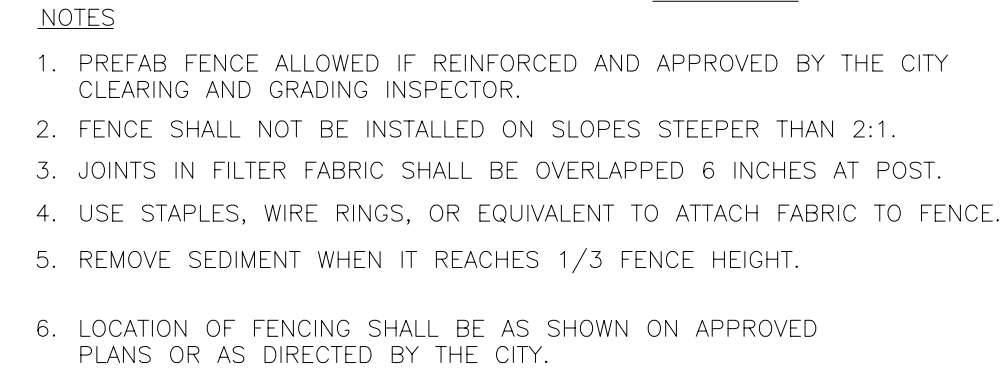
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A cross-sectional diagram showing a log stake being driven into the ground. The stake is a vertical wooden post with a circular log section at the top. The log section has concentric rings. Two horizontal lines, representing jute twine, are laced across the log section. The stake is shown being driven into the ground, with the ground surface indicated by a horizontal line. Below the ground surface, the stake is surrounded by a pattern of interlocking rectangular shapes, representing the ground or a specific soil type. Labels with arrows point to various parts of the stake and the twine.

2X2X24" CEDAR STAKE, 12" ON CENTER, ALTERNATING SIDES

JUTE TWINE, LACED ACROSS LOGS

12" DIAMETER COIR LOG SET FIRMLY IN SOIL

LIVE WILLOW STAKES @3' O.C. ALTERNATING SIDES OF COIR LOG

SECTION

- COIR LOG NOTES
1. COIR LOG SHALL BE A COCONUT FIBER ROLL, 12" DIAMETER, DENSITY OF 9 POUNDS PER CUBIC FOOT, 20 FEET LONG.
  2. STAKES SHALL BE 2X2 LIVE WILLOW STAKE, 24" MINIMUM LENGTH.
  3. JUTE TWINE FOR TYING TOGETHER ENDS OF ABUTTING COIR LOGS AND FOR LACING ACROSS TOP OF LOGS SHALL MEET MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
  4. ACCEPTABLE PRODUCTS:  
NEDIA ENTERPRISES KOIRLOG (718/740-5171)  
BITTERROOT RESTORATION ARMAFLOR FIBER-ROLL  
406/961-4991)

12" MIN

PAVED ROW

GEOTEXTILE

DRIVEWAY RAMP OR PAVED SURFACE

TEMPORARY CULVERT AS REQUIRED

100' MIN

50' ATB, 4" THICK

24' MIN

EXISTING GROUND

PAVED ROW

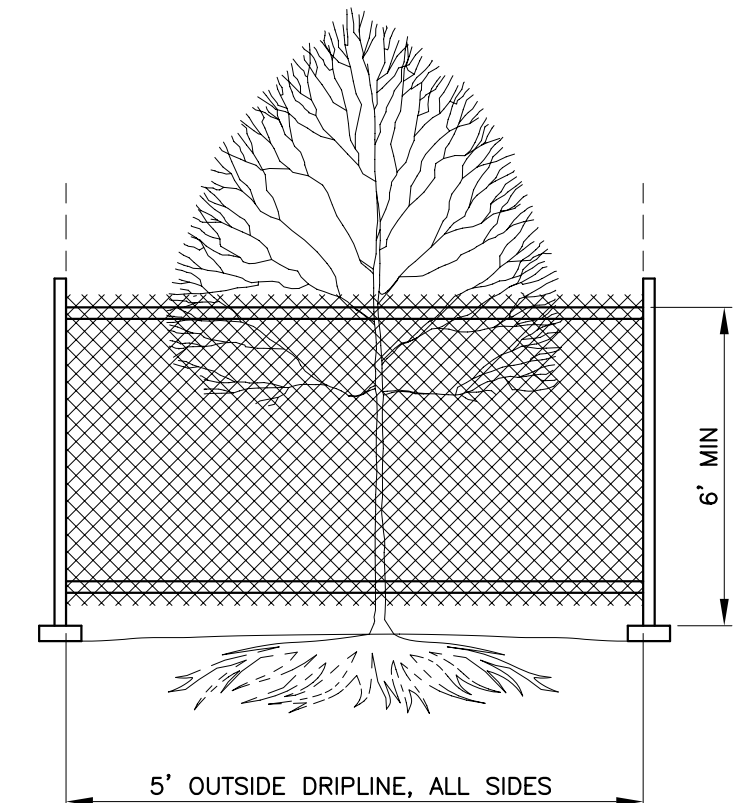
GEOTEXTILE BENEATH QUARRY SPALLS

4" TO 6" QUARRY SPALLS

25' RADIUS

## NOTES

1. 6' HIGH TEMPORARY CHAINLINK FENCE SHALL BE PLACED AT DRIFLINE OF TREE TO BE SAVED. FENCE SHALL COMPLETELY ENCIRCLE TREE(S). INSTALL FENCE POSTS USING PIER BLOOD ONLY. AVOID DRIVING POSTS OR STAKES INTO MAJOR ROOTS.
2. TREATMENT OF ROOTS EXPOSED DURING CONSTRUCTION: FOR ROOTS OVER 1" IN DIAMETER DAMAGED DURING CONSTRUCTION, MAKE A CLEAN STRAIGHT CUT TO REMOVE DAMAGED PORTION OF ROOT. ALL EXPOSED ROOTS SHALL BE TEMPORARILY COVERED WITH DAMP BURLAP TO PREVENT DRYING, AND COVERED WITH SOIL AS SOON AS POSSIBLE.
3. WORK WITHIN PROTECTION FENCE SHALL BE DONE MANUALLY. NO STOCKPILING OF MATERIALS, VEHICLES, TRAFFIC, OR STORAGE OF EQUIPMENT OR MACHINERY SHALL BE ALLOWED WITHIN THE LIMIT OF THE FENCING.



**C** TREE PROTECTION  
NTS

NOT FOR CONSTRUCTION  
ALL INFORMATION  
NOT INCLUDED

[illegible]



EROSION AND SEDIMENT CONTROL NOTES

1.

The approved Construction Sequence shall be as follows:

a. Conduct pre-construction meeting.

b. Flag or fence clearing limits.

c. Post sign with name and phone number of TESC supervisor.

d. Install catch basin protection if required.

e. Grade and install construction entrance(s).

f. Install perimeter protection (silt fence, brush barrier, etc.).

g. Construct sediment ponds and traps.

h. Grade and stabilize construction roads.

i. Construct surface water controls (interceptor dikes, pipe slope drains, etc.) simultaneously with clearing and grading for project development.

j. Maintain erosion control measure in accordance with City of Kirkland Standards and manufacturer's recommendations.

k. Relocate erosion control measures or install new measures so that as site conditions change, the erosion and sediment control is always in accordance with the City TESC minimum requirements.

l. Cover all areas within the specified time frame with straw, wood fiber mulch, compost, plastic sheeting, crushed rock or equivalent.

m. Stabilize all areas that reach final grade within 7 days.

n. Seed or sod any areas to remain unworked for more than 30 days.

o. Upon completion of the project, all disturbed areas must be stabilized and best management practices removed if appropriate.
2.

Approval of this erosion/sedimentation control (ESC) plan does not constitute an approval of permanent road or drainage design (e.g., size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).
3.

The implementation of this ESC plan and the construction, maintenance, replacement, and upgrading of these ESC facilities is the responsibility of the Permittee/Contractor until all construction is approved.
4.

The boundaries of the clearing limits shown on this plan shall be set by survey and clearly flagged in the field by a clearing control fence prior to construction. During the construction period, no disturbance or removal of any ground cover beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the Permittee/Contractor for the duration of construction.
5.

The ESC facilities shown on this plan must be constructed prior to or in conjunction with all clearing and grading activities in such a manner as to ensure that sediment-laden water does not enter the drainage system or violate applicable water standards. Wherever possible, maintain natural vegetation for silt control.
6.

The ESC facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, these ESC facilities shall be upgraded (e.g., additional sumps, relocation of ditches and silt fences, etc.) as needed for unexpected storm events. Additionally, more ESC facilities may be required to ensure complete siltation control. Therefore, during the course of construction it shall be the obligation and responsibility of the Contractor to address any new conditions that may be created by his activities and to provide additional facilities over and above the minimum requirements as may be needed.
7.

The ESC facilities shall be inspected by the Permittee/Contractor daily during non-rainfall periods, every hour (daylight) during a rainfall event, and at the end of every rainfall, and maintained as necessary to ensure their continued functioning. In addition, temporary siltation ponds and all temporary siltation controls shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed, permanent drainage facilities are operational, and the potential for erosion has passed. Written records shall be kept documenting the reviews of the ESC facilities.
8.

The ESC facilities on inactive sites shall be inspected and maintained a minimum of once a month or within 48 hours following a storm event.
9.

All denuded soils must be stabilized with an approved TESC method (e.g. seeding, mulching, plastic covering, crushed rock) within the following timelines:

· April 1 to October 31 - soils must be stabilized within 7 days of grading.

· November 1 to March 31 - soils must be stabilized within 2 days of grading.
10.

At no time shall more than 1' of sediment be allowed to accumulate within a catch basin. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment-laden water into the downstream system.
11.

Stabilized construction entrances shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures, such as wash pads, may be required to ensure that all paved areas are kept clean for the duration of the project.
12.

Any permanent retention/detention facility used as a temporary settling basin shall be modified with the necessary erosion control measures and shall provide adequate storage capacity. If the permanent facility is to function ultimately as an infiltration or dispersion system, the facility shall not be used as a temporary settling basin. No underground detention tank, detention vault, or system which backs under or into a pond shall be used as a temporary settling basin.
13.

Where seeding for temporary erosion control is required, annual rye grasses shall be applied at 30 pounds per acre).
14.

Where straw mulch is required for temporary erosion control, it shall be applied at a minimum thickness of 2".

15.

All erosion/sedimentation control ponds with a dead storage depth exceeding 6" must have a perimeter fence with a minimum height of 3'.
16.

All work and materials shall be in accordance with City of Kirkland standards and specifications.
17.

The ESC facilities shall be constructed in accordance with the details on the approved plans. Locations may be moved to suit field conditions, subject to approval by the Engineer and the City of Kirkland Inspector.
18.

A copy of the approved erosion control plans must be on the job site whenever construction is in progress.
19.

All lots adjoining or having any native growth protection easements (NGPE) shall have a 4' high temporary construction fence (cyclone or plastic mesh) separating the lot (or buildable portions of the lot) from the area restricted by the NGPE and shall be installed prior to any grading or clearing and remain in place until a dwelling is constructed and ownership transferred to the first owner/occupant.
20.

Clearing limits shall be delineated with a clearing control fence. The clearing control fence shall consist of a 6-ft. high chain link fence adjacent the drip line of trees to be saved, wetland or stream buffers, and sensitive slopes. Clearing control fences along wetland or stream buffers or upslope of sensitive slopes shall be accompanied by an erosion control fence. If approved by the City, a four-foot high orange mesh clearing control fence may be used to delineate clearing limits in all other areas.
21.

Off-site streets must be kept clean at all times. If dirt is deposited on the public street system, the street shall be immediately cleaned with power sweeper or other equipment. All vehicles shall leave the site by way of the construction entrance and shall be cleaned of all dirt that 1. The approved Construction Sequence shall be as follows:

a. Conduct pre-construction meeting.

b. Flag or fence clearing limits.

c. Post sign with name and phone number of TESC supervisor.

d. Install catch basin protection if required.

e. Grade and install construction entrance(s).

f. Install perimeter protection (silt fence, brush barrier, etc.).

g. Construct sediment ponds and traps.

h. Grade and stabilize construction roads.

i. Construct surface water controls (interceptor dikes, pipe slope drains, etc.) simultaneously with clearing and grading for project development.

j. Maintain erosion control measure in accordance with City of Kirkland Standards and manufacturer's recommendations.

k. Relocate erosion control measures or install new measures so that as site conditions change, the erosion and sediment control is always in accordance with the City TESC minimum requirements.

l. Cover all areas within the specified time frame with straw, wood fiber mulch, compost, plastic sheeting, crushed rock or equivalent.

m. Stabilize all areas that reach final grade within 7 days.

n. Seed or sod any areas to remain unworked for more than 30 days.

o. Upon completion of the project, all disturbed areas must be stabilized and best management practices removed if appropriate.
22.

Any catch basins collecting runoff from the site, whether they are on or off the site, shall have their grates covered with filter fabric during construction. Catch basins directly downstream of the construction entrance or any other catch basin as determined by the City Inspector shall be protected with a "filter fabric sock" or equivalent.
23.

The washed gravel backfill adjacent to the filter fabric fence shall be replaced and the filter fabric cleaned if it is nonfunctional by excessive silt accumulation as determined by the City of Kirkland. Also, all interceptor swales shall be cleaned if silt accumulation exceeds one-quarter depth.
24.

Rock for erosion protection of roadway ditches, where required, must be of sound quarry rock, placed to a depth of 1' and must meet the following specifications: 4"-8" rock/40%-70% passing; 2"-4" rock/30%-40% passing; and 1"-2" rock/10%-20% passing.
25.

If any part(s) of the clearing limit boundary or temporary erosion/sedimentation control plan is/are damaged, it shall be repaired immediately.
26.

All properties adjacent to the project site shall be protected from sediment deposition and runoff.
27.

Do not flush concrete by-products or trucks near or into the storm drainage system. If exposed aggregate is flushed into the storm system, it could mean re-cleaning the entire downstream storm system, or possibly re-laying the storm line.
28.

Prior to the October 1 of each year (the beginning of the wet season), all disturbed areas shall be reviewed to identify which ones can be seeded in preparation for the winter rains. The identified disturbed area shall be seeded within one week after October 1. A site plan depicting the areas to be seeded and the areas to remain uncovered shall be submitted to the Public Works Construction Inspector. The Inspector can require seeding of additional areas in order to protect surface waters, adjacent properties, or drainage facilities.

60% SUBMITTAL

NOT FOR CONSTRUCTION  
ALL INFORMATION  
NOT INCLUDED

FILE NAME 22116.8 Grading2																			
TIME								REGION NO.		STATE		FED.AID PROJ.NO.							
DATE 02/10/05		BASED ON WSDOT 2-11-05 COMMENTS		2/16/05		me		10		WASH									
PLOTTED BY		GENERAL REVISIONS		4/20/05		me													
DESIGNED BY m. epstein		PER REVIEW COMMENTS 4-27-05		5/2/05		me													
ENTERED BY																			
CHECKED BY																			
PROJ. ENGR.																			
REGIONAL ADM.		REVISION		DATE		BY													

P.E. STAMP BOX		DATE		P.E. STAMP BOX		DATE		<div><div><div>INTERSTATE</div><div>405</div><div>Project Team</div></div><div><div>Washington State</div><div>Department of Transportation</div></div></div>		I-405, SR 520 TO SR 522 KIRKLAND NICKEL PROJECT		SHEET 12 OF 12 SHEETS	
										FORBES LAKE – TESC NOTES			



















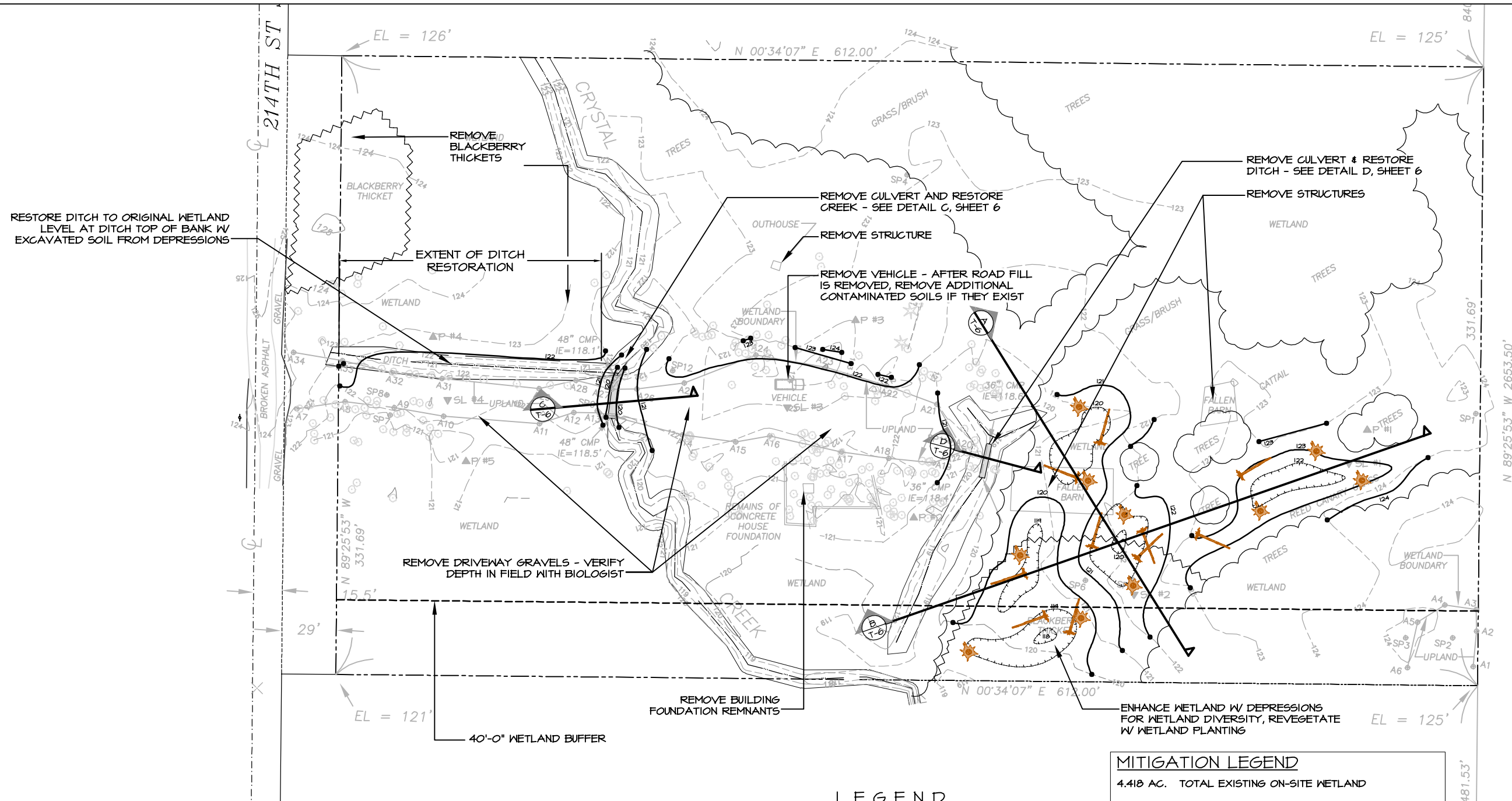
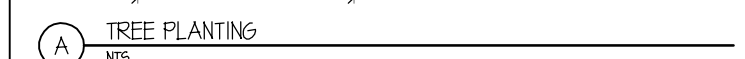


FIGURE T-4: GRADING, DEMOLITION AND HABITAT STRUCTURE PLAN



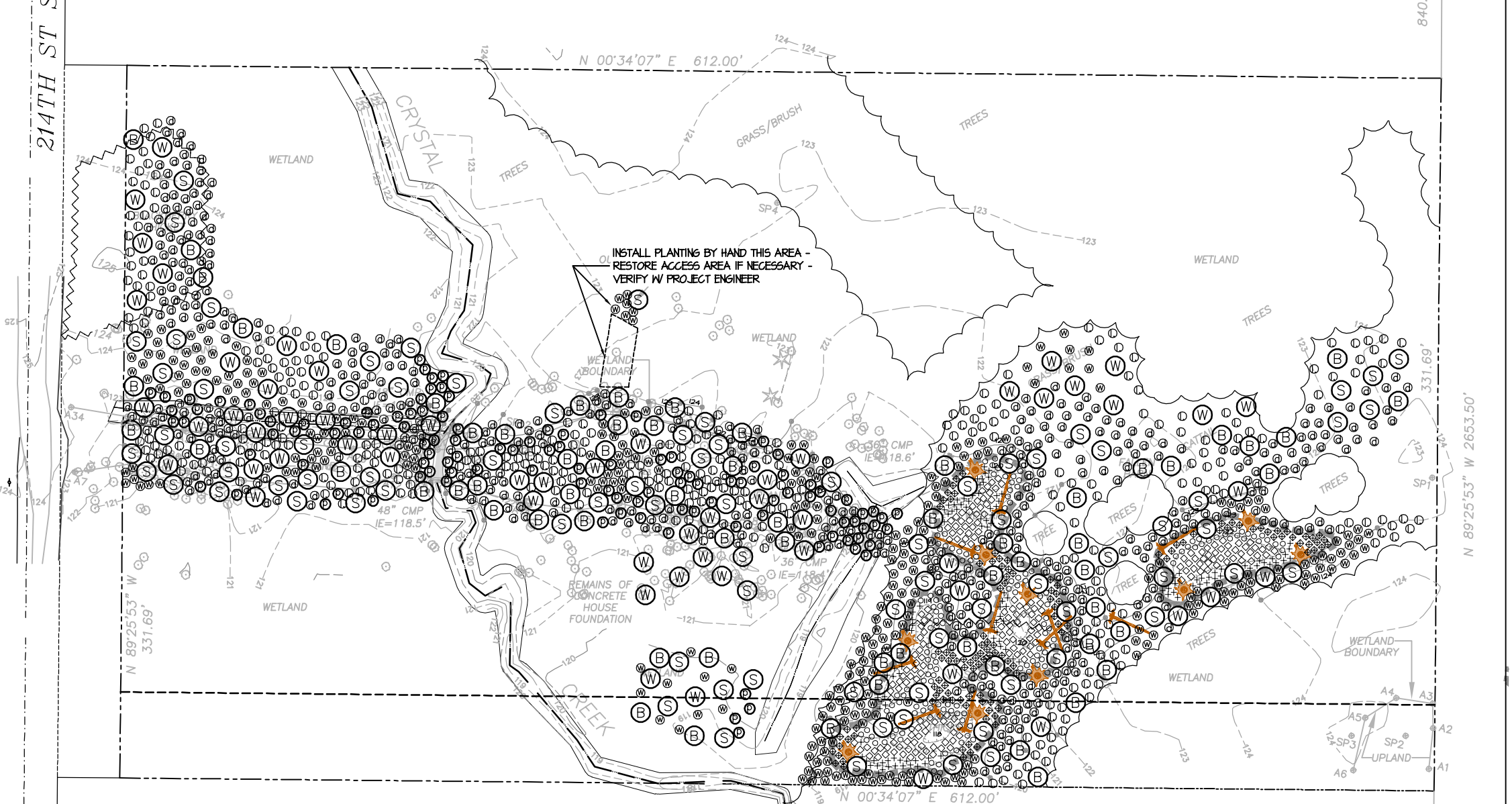
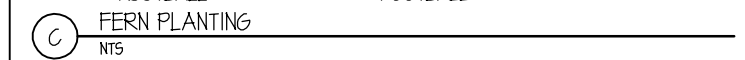





NTS

NOTES:

1. LOOSEN SIDES AND BOTTOM OF PLANTING PIT AND REMOVE DEBRIS
2. ROUGHEN ROOTBALL PRIOR TO INSTALLING



## PLANT SCHEDULE

TREES:		SIZE	QTY.	CONDITION	PERENNIALS / EMERGENTS:		SIZE	QTY.	CONDITION
(B)	POPULUS BALSAMIFERA / BLACK COTTONWOOD	40%: 5'-6' HT. 60%: 2'-3' HT.	65	CONTAINER	⊕	ATHYRIUM FILIX-FEMINA / LADY FERN	1 GAL.	122	CONTAINER
(S)	PICEA SITCHENSIS / SITKA SPRUCE	40%: 5'-6' HT. 60%: 2'-3' HT.	82	CONTAINER OR BALL & BURLAP CONTAINER	○	CAREX OBNUPTA / SLOUGH SEDGE	10 CU. IN. POTS	144	CONTAINER
(D)	SALIX LASIANDRA / PACIFIC WILLOW	40%: 5'-6' HT. 60%: 2'-3' HT.	118	CONTAINER OR BALL & BURLAP	+	LYSICHITON AMERICANUM / SKUNK CABBAGE	1 GAL.	118	CONTAINER
(W)	THUJA PLICATA / WESTERN RED CEDAR	40%: 5'-6' HT. 60%: 2'-3' HT.	54	CONTAINER OR BALL & BURLAP	◇	SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	10 CU. IN. POTS	181	CONTAINER
<u>SHRUBS:</u>		<u>SIZE</u>	<u>QTY.</u>	<u>CONDITION</u>	 BOUNDARY BETWEEN FORESTED WETLAND AND EMERGENT WETLAND				
(G)	CORNUS STOLONIFERA / RED OSIER DOGWOOD	3'-4' HT.	444	CONTAINER					
(I)	LONICERA INVOLUCRATA / BLACK TWINBERRY	1'-2' HT.	307	CONTAINER					
(W)	SALIX SITCHENSIS / SITKA WILLOW	3'-4' HT.	285	CONTAINER					

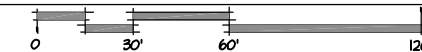
LEGEND

 (10)	HABITAT SNAG
 (10)	LARGE WOODY DEBRIS
	PROPOSED 1'-0" FINISH GRADE CONTOUR

### PLANTING DENSITY

12 FT. O.C. 8 FT. O.C. 3 FT. O.C.	TREES SHRUBS EMERGENTS	RESTORATION AREA
200 FT. O.C. 40 FT. O.C.	TREES SHRUBS	ENHANCEMENT AREA

FIGURE T-5: PLANTING PLAN & DETAILS



60% DRAWINGS – NOT FOR  
CONSTRUCTION  
ALL INFORMATION NOT INCLUDED

FILE NAME				REGION NO.		STATE		FED. AID PRO.		<div><div>P.E. STAMP BOX</div><div>DATE</div></div>		<div><div>P.E. STAMP BOX</div><div>DATE</div></div>		<div><div><div><div><div></div><div>405</div></div><div>Project Team</div></div><div><div><div></div><div>Washington State Department of Transportation</div></div></div></div></div>		1-405 THRASHER'S CORNER SITE 214TH STREET SE; BOTHELL, WA PLANTING PLAN & DETAILS		SHEET 05 OF 06 SHEETS	
DATE 05/31/05				10		WASH													
PLOTTED BY mgarff				JOB NUMBER															
DESIGNED BY MG				CONTRACT NO.		LOCATION NO.													
ENTERED BY																			
CHECKED BY JC																			
PROB.. ENG..																			
REGIONAL ADM.				REVISION		DATE		BY											







